Increasing cleaning behaviour of shared toilet users in Kampala's urban slums, Uganda

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by

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Abstract

Introduction: The cleaning behaviour of shared toilet users is fundamental to reduce diseases associated with dirty toilets. This research assessed shared toilet users' cleaning behaviour and theory-based interventions for increased behaviour.

Methods: A longitudinal research was conducted in Kampala's urban slums between October 2010 to September 2013. The RANAS (risks, attitudes, norms, ability and self-regulation) model of behaviour change, supplemented with social dilemma research factors were used in this research.

Results: Less than 20% of the studied population in the first survey had clean shared toilets. The main psychological predictors for cleaning intentions by sharing households were personal norm to use clean toilets, communication amongst users, cleaning effort, ability to keep the toilet clean, cleaning habit and affective dislike of using a dirty toilet. The second survey showed that less than half of the studied population routinely cleaned their toilets. The psychological factors of collective cleaning behaviour were affective cleaning beliefs, cleaning rosters – ability factor, cleaning being part of daily routine – action planning, remembering when to clean, cleaning commitment and more perceived cleaning belief – social motive factor. The results from the third survey showed that group discussions and more, if complemented with a commitment, can lead to a significant increase in shared toilet users' cleaning behaviour and improve performance of psychosocial determinants.

Conclusion: By initiating discussions among shared toilet users' their cleaning behaviour increased to about three times more than before, as well as the performance of behavioural (psychological) determinants.

Executive summary

Introduction

The cleaning behaviour of shared toilet users in urban slums is fundamental if the incidence of diseases associated with the use of dirty toilets is to be reduced. In this longitudinal research, we used the RANAS (risks, attitudes, norms, ability and self-regulation) model of behaviour change, supplemented with items from the social dilemma theory, to understand shared toilet users' collective cleaning behaviour and designed theory-based interventions to increase cleaning behaviour.

Methods

A longitudinal research involving three surveys was conducted in Kampala's urban slums from October 2010 to September 2013 to assess the cleanliness of shared toilets, shared toilet users' cleaning behaviour, as well as design theory-based interventions to improve the cleaning behaviour. This was complemented by a theoretical review study on the applicability of the social dilemma approach in understanding shared toilet users' collective cleaning behaviour in urban slums. The three field surveys involved: 1) Contextual determinants of households' cleaning intentions for shared toilets in 50 slums in Kampala; 2) shared toilet users' collective cleaning behaviour and psychological determinant factors of the behaviour in three slums – that featured the least clean toilets of the 50; and 3) effectiveness of group discussions in increasing cleaning behaviour of shared sanitation users and effects on behavioural determinants – based on the tested interventions. The tested interventions were different types of group discussions (discussions only and discussions plus a public commitment) among residents with dirty toilets in the second field survey. Structured household questionnaires were used in the case of the three field surveys.

Results

Starting with the first survey, less than 20% of the studied population in each of the five divisions of Kampala used a clean shared toilet. The main psychological predictors for cleaning intentions by sharing households were personal norm to use clean toilets, communication amongst users, cleaning effort, ability to keep the toilet clean, cleaning habit and affective dislike of using a dirty toilet. The results from the second survey showed that less than half of the studied population routinely participated in cleaning their shared toilets. The psychological determinants of collective cleaning behaviour were affective cleaning beliefs, cleaning rosters – ability factor, cleaning being part of daily routine – action planning, remembering when to clean, cleaning commitment and more perceived cleaning belief – social motive factor. The results from the third survey showed that group discussions and more, if complemented with a commitment, can lead to a significant increase in shared toilet users' cleaning behaviour. The main psychosocial determinants that mediated the effectiveness of group discussions were users' belief that people important to them approve of their cleaning (norm factor), ease to clean the shared toilet (ability factor) and cleaning obligation (personal norm factor).

Conclusion

With the interventions, we were able to improve shared toilet users' cleaning behaviour to about three times more than before the interventions, as well as strengthening the performance of psychological determinants. Initiating discussions among users of shared toilets is a viable technique to increase their cleaning cooperation for shared sanitation facilities.

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Introduction

Shared toilets and the hygiene challenge

Over 761 million people, mostly in developing countries, rely on shared toilet facilities (WHO/UNICEF, 2013, WHO/UNICEF, 2014). Shared toilets are meant to provide hygienic disposal and containment of human waste from the population. They provide a convenient alternative to slum residents without access to private toilets. However, if not hygienically maintained, such as cleaning them regularly, dirty toilets expose users to disease outbreaks. Evidence from several studies shows that most of the shared toilets in urban slums are dirty and unsafe to use (Tumwebaze, 2014, Tumwine et al., 2003, Bartlett, 2003, Rheinländer et al., 2010). This is the reason why they are associated with a wide range of preventable diseases, such as diarrhoea, respiratory and intestinal infections (Heijnen et al., 2014, WHO/UNICEF, 2012, Sijbesma, 2008), and can actually encourage open defecation (McFarlane, 2008).

Ensuring cleanliness of the shared toilets guarantees health as well as non-health benefits to the users. Interestingly, studies show that peoples' need for clean sanitation facilities is not primarily driven by health reasons. Health reasons come after situational factors, such as prestige, well-being, privacy and convenience (Jenkins and Curtis, 2005, Diallo et al., 2007, Rodgers et al., 2007). However, whichever reasons come first, cleanliness of shared toilets remains a challenge for most users of shared toilets and this is the main reason they are categorized by the United Nations Joint Monitoring Programme (JMP) for water and sanitation as unimproved sanitation facilities. I contend that it is possible that shared toilets can be improved if users of the facilities take a leading role in their cleaning. Unfortunately, regular cleaning of shared toilets by users in urban slums is reported to be a challenge due to: lack of cleaning cooperation among the users and the lack of cleaning materials, the large number of users, the problem of irresponsible users and the heterogeneity of the users among other reasons

(Tumwebaze et al., 2012, Tumwebaze et al., 2014, Isunju et al., 2011, Wegelin-Schuringa and Kodo, 1997).

This study project aimed to understand and increase regular cleaning behaviour of shared toilet users in urban slums. To our knowledge, other than one study that reported on the habitual cleaning behaviour of latrine users in rural Burundi (Sonego and Mosler, 2014), no studies were found on shared toilet users' cleaning behaviour. Sonego & Mosler (2014) recommended in this study that behavioural factors such as commitment, self-efficacy and satisfaction with a clean latrine or guided practice interventions were important for interventions geared towards improving latrine users' cleaning behaviour. Similarly, several studies have emphasized the importance of theory in behaviour change promotion (Michie et al., 2008, Hardeman et al., 2002, Fishbein and Ajzen, 2010, Schwarzer, 2008, Aboud and Singla, 2012). Theory-based interventions are reported to be more effective in changing behaviour as theoretically derived determinants inform which behaviour techniques would be applicable to change targeted behaviours (Mosler, 2012, Michie and Johnston, 2012, Michie and Abraham, 2004). While theory-based environmental hygiene behaviour research is still limited (Curtis et al., 2009, Coombes and Devine, 2010, Dreibelbis et al., 2013, Peal et al., 2010), it is hoped that these research findings on shared toilet users' cleaning behaviour will trigger more interest among researchers and practitioners to use theory and evidence-based methods in assessing and promoting of sanitation and hygiene-based practices to enhance adoption of health hygiene behaviours.

Theoretical background

Aboud and Singla (2012) highlight theories of behaviour change, evidence of success and failure for past attempts and an in-depth understanding of one's audience as key in behaviour change interventions. However, while there are numerous theoretical behaviour change models on health behaviours (Becker, 1974, Bandura, 1977, Ajzen, 1991, Schwarzer, 2008), a pooled

multi-theoretical model of the RANAS (Risks, Attitudes, Norms, Ability and Self-regulation) by Mosler (2012) is used in the reported studies in this dissertation because of its contextual focus on water, sanitation and hygiene-related behaviours. It is referred to as a pooled multi-theoretical model in this dissertation because it integrates components from different theoretical frameworks, such as the Health Belief Model (HBM), Theory of Planned Behaviour (TPB) and Health Action Process Approach (HAPA) to mention but just a few.

To start with, the HBM is a value expectancy theory that gained prominence in the 1950s in the U.S. It was widely used to explain peoples' failure to practice protective health-related behaviours, such as cancer screenings for early detection and treatment or adherence to medical regimens (Rosenstock, 1974, Becker, 1974). The theory is mainly based on the assumption that individuals' intention to perform a health-related behaviour is dependent on the perceived threat of an illness and the perceived outcome expectations if the behaviour is performed. The perceived threat is influenced by an individual's perceived susceptibility about the likelihood of getting a disease and the perceived severity of the disease if contracted – in terms of medical and social consequences, such as death, pain, and effects on work or family life. The outcome expectancies refer to the anticipated benefits and perceived barriers for performing a behaviour. A behaviour is more likely to be performed if the anticipated benefits outweigh the costs of action. However, while the HBM provides important predictors for different health-related behaviours, its focus is mainly limited to the risk and instrumental attitudinal belief predictors. Secondly the focus of the HBM is also rather on the intention and not the actual performance of the behaviour itself.

The Theory of Planned Behaviour (TPB) focuses on individual health behaviours, just as the HBM. The difference, however, is on TPBs' emphasis on motivational factors as determining the likelihood of an individual's performance of health-related behaviour (Ajzen, 1991). The TPB evolved from the Theory of Reasoned Action, based on the assumptions that behaviour performance is best predicted by the behavioural intention (TRA) (Fishbein and

Ajzen, 1975). Fishbein and Ajzen (1975) state that individuals' intention to perform a behaviour is determined by their attitudinal beliefs about the outcome of performing the behaviour, and the social normative perceptions regarding what important others think about performing the behaviour. The TRA was, however, modified by Ajzen (1991), with the addition of the perceived behavioural control to the attitude and subjective norm components, transforming to TPB. Perceived behavioural control concerns beliefs over an individual's perceived power to perform a behaviour or the availability or absence of resources capable of influencing the formation of behavioural intention and performance of the behaviour (Ajzen and Driver, 1991, Ajzen and Madden, 1986, Ajzen, 1991). It provided explanation for the factors outside TRA that affect individuals' intention of performing a behaviour or performance of the behaviour itself. Again, like the HBM, while TPB has been greatly applied to explain a wide range of behavioural manifestations in varying environmental situations (Armitage and Conner, 2001), it has also been criticized for its limited focus on the intention-behaviour gap factors. The critiques emphasize the importance of post-intentional factors, such as maintenance and recovery self-efficacy, as well as action and coping planning as equally important for actual behaviour performance (Luszczynska and Schwarzer, 2003, Sniehotta et al., 2005, Lippke et al., 2005). Thus, this limitation for almost all the continuum models and theories lead to the development of new approaches that aimed to bridge the intention-behaviour gap, notable among them being the Health Action Process Approach (HAPA) (Schwarzer, 2008).

The HAPA model of health behaviour adoption and maintenance mainly contains two distinctive phases: the first is the pre-intentional motivational phase that leads to the formation of behavioural intention, and the second is the post-intentional volitional phase, the factors of which lead to the actual performance of a behaviour (Schwarzer, 2008). The pre-intention motivational phase is when an individual develops an intention to adopt or maintain a health behaviour. Intention development in this phase is dependent on: the risk perception – a persons' perceived risk of getting a disease, as well as the associated consequences and his or her

competencies; expected outcomes – pros and cons associated with the performance of a behaviour; and action self-efficacy – belief of one's abilities to perform a desired action (Schwarzer, 2008). In the post-intentional volitional phase, Schwarzer (2008) states that after a person has formed a good intention, it has to be transformed into detailed instructions on how the behaviour can be performed. He contends that the behavioural action has to be maintained after it has been initiated, and that this can be achieved not through a single act of will, but rather with the involvement of self-regulatory skills and strategies, such as planning and self-efficacy (Schwarzer, 2008). Planning is divided into action planning – referring to the specific situation parameters and a sequence of performance of a behaviour, such as stating 'when', 'where' and 'how', and coping planning – referring to planning that involves identification of anticipated barriers that may hinder performance of intended behaviours and generation of alternative behaviours to overcome the barriers. Self-efficacy on the other hand is subdivided into three stages: action self-efficacy in which an individual shows motivation or optimistic belief to perform a behaviour, maintenance self-efficacy (coping self-efficacy) (optimism about an individual's ability to deal with challenges that may develop in the performance of a behaviour), and recovery self-efficacy that relate to the ability to overcome failures or setbacks to a behaviour performance. As earlier mentioned, the HAPA provided a more elaborate theoretical model in which not only behavioural intention but also actual behaviour performance is explained.

The three mentioned theories and the others not discussed here, such as, The Trans-theoretical Model of Behaviour Change (TTM) (Prochaska and DiClemente, 1982) and Social Cognitive Theory (SCT) (Bandura, 1991, Bandura, 2004), have been the most applied continuum and stage models in explaining behaviour change. However, despite the importance of each of the mentioned theoretical models, it is also important that researchers and practitioners involved in behaviour change promotion and implementation of programs know how to use these theories and are able to develop empirical theory and evidence-based

interventions to change behaviour (Bartholomew et al., 1998). Based on this background, this study used the risks, attitudes, norms, abilities and self-regulation (RANAS) model of behaviour change techniques, targeting water and sanitation in developing countries (Mosler, 2012) and items from social dilemma theory (Dawes, 1980) to understand the processes influencing cleaning behaviour of shared toilet users in Kampala slums. RANAS is also preferred because of its multi-theoretical lining and the provision of intervention techniques that facilitate design and implementation of behavioural interventions which trigger behaviour change. And, since a shared toilet user's cleaning behaviour is likely to be dependent on the cleaning cooperation of other user families, the RANAS model was supplemented with items from the social dilemma approach.

The RANAS model of behaviour change techniques

RANAS is founded on elements from different health social psychology models, such as the Health Belief Model (HBM) (Becker, 1974), the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and the Health Action Process Approach (HAPA) (Schwarzer, 2008). RANAS is essentially structured in five conceptual block factors, with each having a set of measurable variables: risks, attitudes, norms, ability and self-regulation factors (Mosler, 2012).

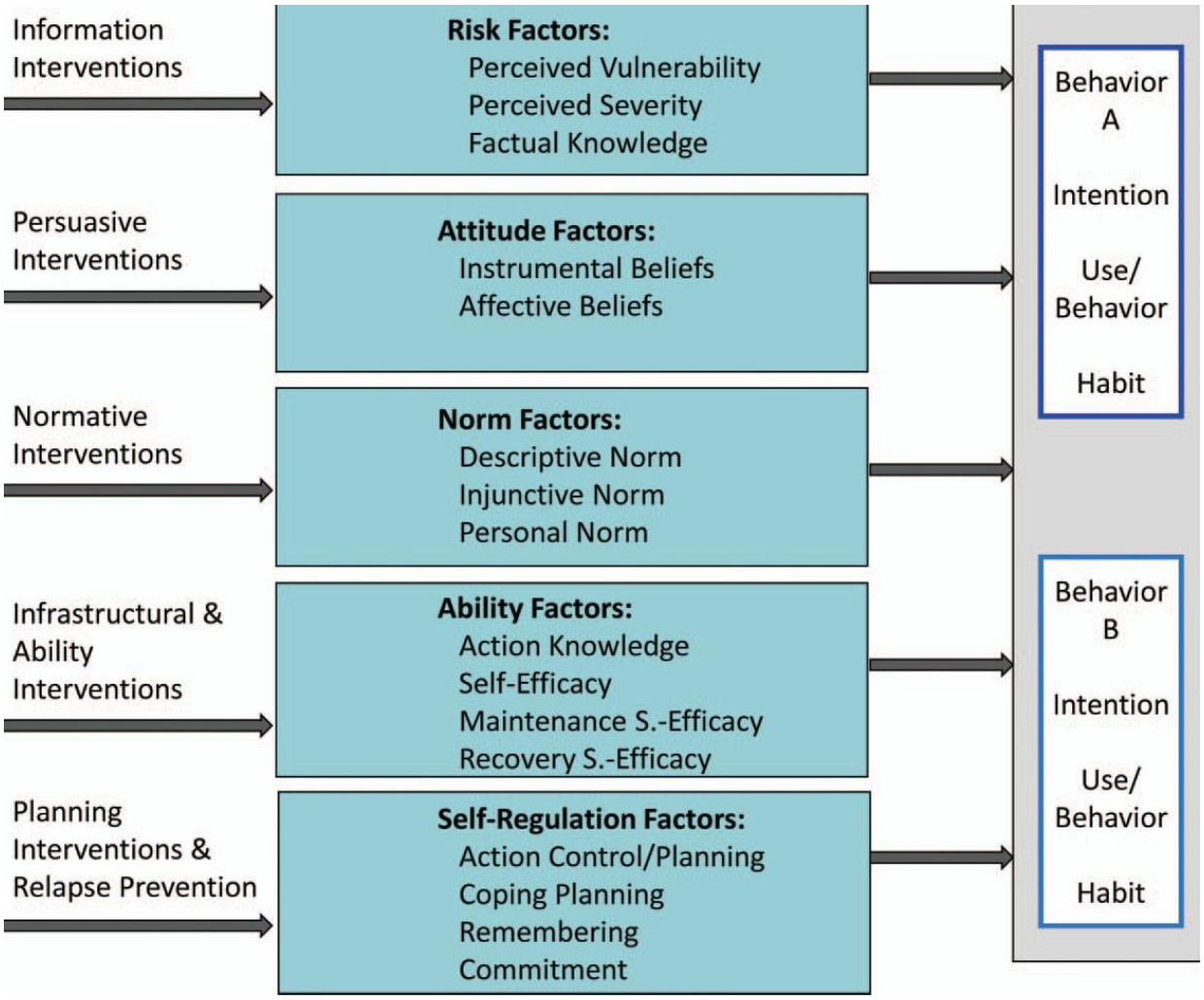

Figure 1: The RANAS Model of behaviour change (Mosler, 2012)

Risk factors (Rosenstock, 1974) relate to a person's perceived vulnerability of contracting a disease, the severity and consequences associated with the disease if contracted, and factual knowledge on disease exposure agents and how they can be prevented (Floyd et al., 2000).

Attitudinal factors denote a person's inclination to respond to a behaviour with some degree of like or dislike of the behaviour (Fishbein and Ajzen, 2010). Attitudinal factors can be categorized into instrumental and affective beliefs. Instrumental beliefs are outcome expectancies, such as beliefs on costs in terms of money, time, effort and the benefits associated with a desired behaviour (Eagly and Kulesa, 1997, Huber et al., 2013, Tumwebaze et al., 2014).

Affective beliefs are feelings developed from thinking about a behaviour or its performance (Trafimow and Sheeran, 1998, Giner-Sorolla, 2001, Crano and Prislin, 2006).

Normative factors are constituted by descriptive norm that reflects perceptions on behaviours typically performed by others, and injunctive norm which show perceptions on behaviours typically approved or disapproved by people an individual considers important in his or her life (Cialdini et al., 2006, Schultz et al., 2007).

Ability factors reflect a person's confidence and belief to perform a behaviour (Ajzen, 2002, Bandura, 1990). Performance of a desired behaviour also needs a person to have traits of positive self-efficacy. This means abilities to organise and execute the courses of action required to manage potential conditions, such as dealing with barriers that arise during the performance of the behaviour and recovery from setbacks (Vries et al., 1988, Bandura, 2004, Schwarzer, 2008). One major precondition of ability factors is action knowledge, the assumption that one knows how to perform the desired behaviour (Frick et al., 2004).

Self-regulation factors take precedence after the behaviour is in place and is being performed, but needs sustainability over time (Bandura, 2004, Schwarzer, 2008). To consistently perform a desired behaviour, an individual should have the ability to manage conflicting goals and distracting situations (Gollwitzer et al., 2005, Gollwitzer and Sheeran, 2006). Self-regulation factors involve: action planning (perceived thoughts on how to set up the behaviour), action control (strategy for continuous standard evaluation of on-going desired behaviour) (Schwarzer, 2008), remembering and commitment to perform the desired behaviour (Tobias, 2009).

As previously stated, the RANAS model of behaviour change is complemented with items from the social dilemma theory that we think are important to this research on shared toilet users' collective cleaning behaviour. The section below points out the main factors that have been reported as relevant in influencing collective decision making.

The social dilemma approaches to understanding the collective cleaning behaviour among users of shared toilets

The social dilemma approaches are of importance in understanding the cleaning behaviour of shared toilet users because of their emphasis that communication is essential in prompting the cooperation and collective action that are important in solving social dilemmas (Balliet, 2010).

Social dilemmas are conflict situations in which individuals commonly make decisions for the benefit of themselves other than the group of which they are part, by putting higher priority on own their short-term interests than on the interests of others (Liebrand et al., 1992). However, some researchers contend that since individual decisions take place in societal or group settings, there should be a strong interdependence between individual's own outcomes and those of others (Liebrand, 1983). The most widely used definition of social dilemmas is that proposed by Dawes (1980), who defines social dilemmas as situations characterized by two main properties:

i. the social payoff to each individual for defecting (non-cooperative) behaviour is higher than the payoff for cooperative behaviour, regardless of what the other society members do, and
ii. all individuals in the society receive a lower payoff if all are non-cooperative than if all cooperated.

In the case of the cleaning of shared toilets, each user is in the social dilemma:

i. If he or she does not participate in cleaning, then he or she is better off because he or she does not have to make an effort to clean, but benefits from the cleaning of others.
ii. However, if many or all users do not participate in cleaning, then all users of the shared toilet suffer from the harm caused by being exposed to the risk of contracting diseases.

Social dilemma research has focused mainly on: prisoner's dilemmas, commons dilemmas and public goods dilemmas.

Prisoner's dilemmas originate from game situations in which individuals' were simultaneously presented with a binary choice matrix of either cooperation or defection

(Axelrod and Hamilton, 1981). The two individuals were separated by placing them in different rooms and were not allowed to communicate with each other when making decisions. The best individual outcome was attained by choosing to defect (non-cooperation) when the other individual chose to cooperate. However, the consequences of each decision taken by an individual were specified in the payoff matrix of the game, which were made known to both individuals beforehand (Liebrand, 1983). Individuals were better-off if they all chose to cooperate than to defect (Balliet, 2010).

Public goods dilemmas focus on resources or services that can be enjoyed by all members of a group or society regardless of their contribution (Sheizaf and Larose, 1993, Brown-Kruse and Hummels, 1993). While it could be in each individual's interest not to pay for these services, but to still have access to them, if all individuals decided not to pay for such services, they are likely to collapse (Balliet, 2010). Public goods often attract free-riders, people who use public services, but who do not pay their share of taxes or fares, which benefit all citizens by contributing to the sustainability of the services provided. Free riders lead to social dilemmas if all or too many people are not paying to sustain the provision of public goods that benefit all citizens (Fehr and Fischbacher, 2002). Some examples of public goods include: roads, transport, education and health services, among others. Most shared toilets in slums are provided by the owners of the households (Mazeau et al., 2013). As such, some users show no responsibility in their cleaning or reason that it is the role of the household owners to clean the shared toilets since they pay rent (Wegelin-Schuringa and Kodo, 1997, Tumwebaze, 2014). However, communication in public goods dilemmas boost resolution factors, such as trust, group identity, cooperation and norms, and could be essential in understanding the cleaning behaviour of shared toilet users (Balliet and Van Lange, 2013).

Commons dilemmas originate from the tragedy of the commons (Hardin, 1968). They are based on the paradox about the grazing patterns of herdsmen from a community who share a common resource (grazing land) that they overgrazed, leading to its depletion (Hardin, 1998).

According to Ostrom et al. (2002), the tragedy of the commons is central in human ecology and the study of the environment. Examples of commons dilemmas include, but are not limited to, depletion of water sources and forests, environmental pollution, and poor solid waste and excreta disposal. Shared toilets can become an environmental and health hazard if poorly used or not kept clean (Tumwine et al., 2002, McFarlane, 2008), and thus, can be thought as a commons dilemma. Commons and public goods dilemmas are the aspects analysed in this paper to understand the cleaning behaviour of shared toilet users.

As indicated in the different social dilemma situations, communication is predominantly reported as fundamental in resolving social dilemmas and fostering the promotion of cooperation and collective action (Kopelman et al., 2002, Dawes, 1980, Weber et al., 2004, Balliet, 2010). Communication manifested by individuals making decisions that support cooperation and collectivism are important to sustain resource use and/or ensure the durability of public goods (Olson, 1965, Ostrom, 1998, Ostrom, 2000, Vanvugt and DeCremer, 1999). It plays a moderating function in cooperation or group relationships that influence decision making processes (Bornstein et al., 1989). A study by Bornstein and Rapoport (1988), assessing intergroup competition for the provision of step-level public goods in two groups, found a positive relation for the group that was allowed to discuss their conflict amongst its members before making private decisions on whether to contribute their endowments to the benefit of the group (Bornstein and Rapoport, 1988). Communication's ability to enhance feelings of group identity and commitment to cooperate have been referred to by some researchers as its most cardinal function (Kerr and Kaufman-Gilliland, 1994). While communication mediums may be different depending on the experiment and communication motive, some researchers have found that face-to-face communication elicits more cooperation than e-mail communication depending on the nature of decisions to be made, and the content and complexity of the issues for discussion (Balliet, 2010, Frohlich and Oppenheimer, 1998).

In addition, it was reported that the content of messages could be a potent factor in resolving social dilemmas (Thompson and Stoutemyer, 1991). Thompson and Stoutemyer (1991) show in their study on water resource use as a commons dilemma that educational interventions that focus on the long-term consequences of water use, and the efficacy of personal action to conserve are more effective in reducing water consumption among residential water users than messages that focus on the economic advantages of conservation or a control condition that only gave tips on how to conserve (Thompson and Stoutemyer, 1991).

Likewise, it may be that communication among users of shared toilets to participate in their cleaning is important to maintain the cleanliness of the facilities. Unfortunately, research has shown that individuals often make non-cooperative decisions regardless of their effect on others, even when the aggregate harm is greater than the profit attained by an individual alone (Kopelman et al., 2002). Thus, for collective cleaning of shared toilets, the social dilemma items below were investigated in Study 2 and integrated with the RANAS factors in Study 3 of this dissertation.

First, the size of a group is reported to have an influence on individual decisions' manifestation of cooperative or non-cooperative behaviour (Bonacich et al., 1976). Most social dilemma studies have shown that the level of cooperation and self-efficacy declines with the increase in group size (Fox and Guyer, 1977, Liebrand, 1984).

Secondly, social dilemma studies indicate that the nature of individuals' groups, their developments and interactions influence the way they behave in dilemma situations (Moreira et al., 2013). Weber et al., (2004) report that group associations and identifications are important social features in social dilemmas. They contend that individuals often behave differently when in groups than when alone (Weber et al., 2004). In groups where individuals have strong associations with each other, trust and cooperation is high and may result in the prioritization of collective actions or individuals restraining themselves for the collective good of the group (Kramer et al., 1986).

Thirdly, most studies show that women are more likely than men to be cooperative when dealing with social dilemmas (Stockard et al., 1988, Sell et al., 1993, Nowell and Tinkler, 1994, Cadsby and Maynes, 1998). As reported in social dilemma studies, women have also been found to have more influence than men in the management of water and sanitation services (Assaad et al., 1994, MoWE, 2009).

Fourthly, a number of studies in social dilemmas show that individual inferences about the causes of certain events or behaviours influence their collective decision making processes (Duncan, 1976, Blount, 1995, Stouten et al., 2006). For example, a study on information preferences and the corresponding consumption behaviour in common pool resource management found that individual decisions to voluntarily restrict consumption in resource crises, among other things, depended on what they believed caused the scarcity (Brucks and Mosler, 2011). Similarly, a study conducted in California when there was a severe drought found that people restricted their use of water to optimal limits if they believed that the water shortages were due to natural climatic conditions than induced by other people (Talarowski and McClintock, 1978).

Furthermore, social motives arising when individuals take into consideration others' outcomes when making choices, is reported as the other important factor influencing communication and cooperation in social dilemmas (Maccrimmon and Messick, 1976). Most evidence on social motives shows that people with high individualistic and competitive traits are more aggressive in making self-gains than people with cooperative and altruistic characteristics (Kramer et al., 1986, Roch and Samuelson, 1997, Kopelman et al., 2002). A study on the effects of social motives on behaviour across two cultures (i.e., Americans and Dutch) looking at altruism, cooperation, competition and individualism, found that cross-cultural differences existed in regard to the distribution of social motives. Whereas in Holland the percentage of altruistic and cooperative individuals was 50% to 60%, in America these percentages ranged from 26% to 40%.

Additionally, evidence from a number of studies shows that social norms are instrumental in fostering cooperation among people faced with social dilemmas (Biel et al., 1999, Bicchieri, 2002, Thøgersen, 2008). In a study by Biel and Thøgersen (2007) on the activation of social norms in social dilemmas, it is reported that norms need to frequently be activated for people to keep following them (Biel and Thøgersen, 2007). Social norms may be injunctive (approved behaviours by important others or institutionalized), descriptive (performed behaviours) or personal norms (self-internalized behaviours performed as personal obligations) (Fishbein and Ajzen, 2010, Mosler, 2012, Thøgersen, 2008). With regard to personal norms, it is argued that people may conform to a social norm if they find it legitimate or reasonable, and not necessarily because of fear or sanctions (Dawes, 1980, Thøgersen, 2008).

Similarly, social dilemma studies show that individual's social attachment or sense of belonging determines their level of cooperation in any given dilemma situation (Van Vugt and Hart, 2004, Blake and Fred, 1989, Dawes et al., 1988). A study by Dawes et al., (1988) on the importance of group identity in cooperation, reveals that consensus is an important indicator of social identity and can in it-self be a sufficient condition to elicit cooperation among individuals.

Likewise, several studies show that individuals make decisions regarding the way they behave depending on how they perceive or interpret the behaviour of other individuals in dilemma situations (Fujii and Yanagida, 2005, Bogaert et al., 2008, Brucks and Mosler, 2011, Nettle et al., 2011, Balliet and Van Lange, 2013, Declerck et al., 2014). People are more likely to be cooperative if they expect others to do the same (Kollock, 1998, Dawes, 1980, Axelrod and Hamilton, 1981).

Lastly, research shows that the confidence, faith or feelings of predictability that an individual has about others influences their cooperation tendencies in social dilemma situations (Jonker and Treur, 1999). Rothstein (2000) in his article on trust, social dilemmas and the

strategic construction of collective memories, contends that trust is needed for an individual to move from non-cooperative to cooperative states (Rothstein, 2000).

In a nutshell, the RANAS and social dilemma factors discussed above provided guidance in the formulation of the research questions below to comprehend the cleanliness situation of shared toilets and users' of the facilities cleaning behaviour.

Research questions

To understand the cleanliness situation of shared toilet facilities, and the predictors for users cleaning behaviour and the intervention techniques to increase the behaviour, the following research questions were developed from the integrated RANAS and social dilemma factors.

Study 1: Determinants of households' cleaning intention for shared toilets: case of 50 slums in Kampala, Uganda

This study helped to ascertain the cleanliness of shared toilets and determinants of user households' cleaning intentions by using the following research questions:

- Q1: How clean are households' shared toilets in Kampala's urban slums?
- Q2: Which are the determinants for households' cleaning intention for shared toilets in urban slums?

Study 2: Why clean the shared toilet if others don't? Using a social dilemma approach to understand users of shared toilets' collective cleaning behaviour in urban slums: a review

To establish the relevance of the social dilemma factors on the collective cleaning behaviour of shared toilet users, the following research question was used:

- Q3: Which social dilemma factors aid in understanding the collective cleaning behaviour of shared toilets in urban slums?

Study 3: Shared toilet users' collective cleaning and determinant factors in Kampala slums, Uganda

To examine the influence of the RANAS and social dilemma factors on the collective cleaning of shared toilet users, the following research questions were used:

- Q4: Which psychosocial and social dilemma determinants influence the collective cleaning behaviour of shared toilet users in Kampala slums, Uganda?
- Q5: Which social dilemma factors influence shared toilet users' cleaning commitment?

Study 4: Effectiveness of group discussions in increasing cleaning behaviour of shared sanitation users in Kampala slums, Uganda and effects on behavioural determinants

To assess the effectiveness and effects of group discussions and discussions plus commitment on shared toilet users' cleaning behaviour and on the behavioural determinants, the following research questions were used:

- Q6: Do group discussions change shared sanitation users' cleaning behaviour and the psychosocial behavioural determinants?
- Q7: Does adding a commitment after the discussion have additional effects on changing cleaning behaviour and the psychosocial behavioural determinants?
- Q8: How do group discussions work with regard to psychosocial behavioural determinants?
- Q9: Does adding a commitment after the discussion make them work differently?

Study 1: Determinants of households' cleaning intention for shared toilets: case of 50 slums in Kampala, Uganda

Abstract

Cleaning shared toilets is important if users are to receive the significant health, social and economic benefits associated with having access to these facilities. However, achieving and maintaining hygienic toilets shared by several user households in urban slums is usually a challenge. This study assesses determinants of households' cleaning intention for shared toilets in Kampala, Uganda. Using a structured questionnaire for the household interviews and an observation checklist, data from 1019 users of shared toilets was collected in 50 randomly selected urban slums. Data analysis showed that most of the shared toilets are unhygienic. Less than a quarter of the shared toilets, for instance, were hygienically clean to users' satisfaction. The main cleaning intention determinants (p-value <0.05) included: importance of using a clean toilet, the effort involved in cleaning the toilet, the disgust felt from using a dirty toilet, and cleaning habits. Although it is important to have access to sanitation facilities, emphasis should be placed on how to engage users to ensure that the facilities used are appropriately cleaned and maintained.

Key words: Cleaning intention, Households, Shared toilets, Slums, Uganda

Introduction[1]

There has been slow progress in regard to slum dwellers having access to improved sanitation in urban developing cities (Martínez et al., 2008, UN, 2012, WHO/UNICEF, 2012). Some of the reasons for inadequate sanitation in urban informal settlements vary from population explosion (Omambia, 2010, UN-Habitat, 2012), the reluctance of the authorities to develop sanitation systems (Mara, 2003, Huchzermeyer, 2008), to tenure security (Scott et al., 2013) and negligence of the household owners (Isunju et al., 2011). Increasing population densities in slums has contributed to diminishing space for many on-site conventional sanitation systems (Schouten and Mathenge, 2010, Katukiza et al., 2012). This explains why shared as opposed to private sanitation facilities are dominant in slum settlements (Mukhija, 2002, Karn et al., 2003, Gulyani and Talukdar, 2009, Kulabako et al., 2010).

Although shared toilets are currently classified as unimproved by the United Nations Joint Monitoring Programme for Water and Sanitation, they are the most significantly increasing excreta disposal system in most slum settlements (WHO/UNICEF, 2012). Shared toilets are facilities where each toilet room is used by different households/families (Gulyani and Talukdar, 2008, Günther et al., 2011). This fact underpins their importance and explains why some experts envision them as the most feasible excreta containment option for densely populated slum settlements (Schouten and Mathenge, 2010). Several studies indicate that improvements in water, sanitation and hygiene significantly reduce a wide range of preventable diseases, such as diarrhoea, cholera, and trachoma (Connolly et al., 2004, Ashbolt, 2004, Fewtrell et al., 2005, Mara et al., 2010, Bartram and Cairncross, 2010, Montgomery et al., 2010). Diarrhoea alone is one of the leading causes of child mortality among children less than five years of age in the world (Unicef, 2012) causing approximately 2.5 million deaths per year (Kosek et al., 2003). Africa and South-East Asia have the highest diarrhoea mortality rates

[1] This study is published: Tumwebaze, I. K., Niwagaba, C. B., Günther, I., & Mosler, H.-J. (2014). Determinants of households' cleaning intention for shared toilets: Case of 50 slums in Kampala, Uganda. *Habitat International*, 41, 108-113.

(Boschi-Pinto et al., 2008) among this demographic group. In addition to its high child mortality rate from diarrhoea, Africa also has very high adult mortality due to diarrhoea (Boschi-Pinto et al., 2008).

It has been shown that if sanitation facilities are poorly maintained or inappropriately used, it is difficult to guarantee the health of the users and the convenience of using the facilities (Buttenheim, 2008, Owusu, 2010, Kimani-Murage and Ngindu, 2007). Studies indicate that while some populations in developing countries have access to clean toilet facilities, most in urban informal settlements are dirty (Tumwine et al., 2003, Bartlett, 2003, Rheinländer et al., 2010). Using dirty toilets is often a health hazard for the users (Sijbesma, 2008). Holistically, while personal, domestic and environmental hygiene are important to prevent diseases related to poor sanitation and poor hygiene, maintaining the cleanliness of shared toilets is just as crucial.

Cleanliness is recognized as an important component of hygiene behaviour (Curtis et al., 2000, Cairncross and Shordt, 2004, Sijbesma, 2008). There is increasing awareness among public health practitioners of hygiene's contribution to the realization of benefits from the provision of safe water and improved sanitation facilities (Esrey et al., 1991, Montgomery et al., 2010, Bartram and Cairncross, 2010). Some researchers have argued that while there is a clear and pressing need for increased levels of investments in water and sanitation facilities, they need to be accompanied by well-designed hygiene programmes or the environmental health benefits produced by these investments could be lost (Tumwine et al., 2002). Nevertheless, hygiene is still given little consideration in the public health field (Curtis et al., 2011). Research on hygienic shared toilet usage and the cleaning of shared toilets by users is also limited among public health practitioners and researchers. Despite these research deficits, the appropriate use and maintenance of shared toilets in a clean way is prioritized by health practitioners.

This article provides insight into the determinants of households' cleaning intention for shared toilets in urban slums. It is based on a primary study conducted in randomly selected slums in Kampala, the capital city of Uganda. While encouraging behaviour change, such as hygiene improvement is often complex (Curtis et al., 2000), critical understanding and assessment of the factors that influence the promotion or performance of specific behaviours is always crucial (Mosler, 2012). The role of intention as a determinant factor in individuals' performance of desired behaviours is based on the theories of reasoned action and planned behaviour (Fishbein and Ajzen, 2010). Individual intention to perform hygiene-related behaviours, such as regular cleaning of the shared toilet or hand washing with soap at critical times, may be influenced by both psychological and non-psychological factors (Jenkins and Scott, 2007, Clayton and Griffith, 2008, Curtis et al., 2009). The application and relevance of these theories is further expounded in the RANAS model [R(isk), A(ttitudes), N(orms), A(bilities) and S(elf-regulation)] of behaviour change (Mosler, 2012) that was developed from a pool of social cognitive theories. Psychological belief factors, such as attitudes, norms, abilities, risks, habits and expressed demand are discussed in this paper.

Material and methods

Research area

Field research was carried out in randomly selected slums of Kampala, the capital city of Uganda. Like most cities in developing countries, over 60 % of the population in Kampala resides in slums (UBOS, 2005, UN-Habitat, 2007). Kampala district is divided into five areas that are presently referred to as municipal councils by the Kampala Capital City Authority (KCCA). These are: Central, Makindye, Kawempe, Nakawa and Rubaga. The municipal councils are divided into parishes, and there are a total of 64 parishes. The last administrative units in the parishes are villages or zones. Out of 307 villages in Kampala City, 188 are recognised as slums by the city authorities. Approximately 61.2% of the people, more than half

of the population in Kampala, lives in slums (Tumwebaze et al., 2012). Research for this study took place in all five municipal councils, in 39 parishes and 50 slums.

Procedure

Data was obtained using structured household questions and an interviewer checklist. The interviewees were slum household residents and only those persons aged 18 or over who consented to be interviewed were enrolled in the study. The household was the unit of analysis in this study and interviews were done at only one household per housing unit. Each housing unit often contains a number of households. In addition, because of the close nature of the households and dense housing units in most of the slums, interviewees were enrolled from every third housing unit. Preference was given to the respondents of the first household of each unit. However, in cases where no one was home at the first household, or only persons under 18 years of age were present, or the eligible person in the household did not consent to be interviewed, the interviewers then approached the next household.

Household interviews were conducted in the local native language (Luganda), which is the language most spoken in the slums. A team of 15 interviewers were recruited and trained on the data collection process and the interviewers were mainly university graduates. Each household interview lasted approximately 45 minutes. A team of three interviewers normally did 30 household interviews in two days, with each interviewer interviewing respondents of five households per day. Five local leaders from the five municipal councils were also recruited as field supervisors to guide and introduce the interviewers in the zones.

Sample

A total of 1500 household respondents participated in this research. Of the 50 randomly chosen slums (random sampling with STATA) in Kampala, 390 respondents were from the municipal councils of Kawempe and Makindye, 330 from Rubaga, 210 from Nakawa and 180 from

Central. The reason why there were more respondents in Kawempe and Makindye may be due to the fact that these areas have the highest number of slums in Kampala district (Tumwebaze et al., 2012). Data from 1019 respondents that shared toilets with different households (families) was analysed.

Questionnaire

The variable items and questions were structured by socio-demographic variables, the sanitation situation and intention variables.

Socio-demographic factors

The socio-demographic questions items aimed at capturing information about: the respondents' sex (male/female), education level, household ownership status (tenant/owner), number of people living in the household, and number of children under five years of age in the household.

Sanitation situation

These questions captured data on the sanitation facilities used by the household respondents (private/shared/public/none), and their perceived cleanliness (scale: very dirty to not dirty at all), the number of households sharing a toilet room, the facilities used by children under five years of age, whether shared toilet rooms were lockable (yes/no) and the main problem concerning the cleaning of the shared toilet (nobody feels responsible for cleaning/expensive to buy water to clean/no cleaning materials or detergents/always dirty/difficult to clean because of construction design/ no problem/others).

Cleaning intention determinants

Intention: Cleaning intention - the dependent variable in this study was surveyed through posing the question: ''How strongly do you intend to keep this toilet clean?'' There were five possible answers, ranging from not strong at all to very strongly.

Perceived vulnerability getting a disease: Perceived vulnerability getting a disease has an influence on behaviour performance (Schwarzer, 2008). The question here was: ‘‘How high or low do you feel are the chances that you could get sick if you used a dirty toilet?’’ Nine response scale ranging from very low to very high was used to measure the risk.

Attitudes: Attitudes refer to the evaluation of entities or behaviour by individuals in terms of the outcome expectancies or associated benefits (Eagly and Kulesa, 1997, Mosler, 2012). In addition, attitudes have an affective component on the feelings aroused towards a given entity or behaviour performance (Trafimow and Sheeran, 1998). The questions here were: ‘‘How effortful is it to clean your shared toilet?’’ The responses ranged from not at all effortful to very effortful. ‘‘How much do you like or dislike using a clean toilet?’’ Scale l, I dislike it very much, to Scale 9, I like it very much. ‘‘Do you think it is disgusting to use a dirty toilet?’’ Five response scale – not at all disgusting to very disgusting.

Injunctive norms: Injunctive norms refer to the approval or disapproval by individuals of the behaviour of others (Cialdini et al., 2006, Schultz et al., 2007). This was assessed with the question: ‘‘Do you think that, over all, people who are important to you rather approve or disapprove that you leave a toilet dirty?’’ The response scale ranged from 1, nearly all disapprove to 9, nearly all approve. Here, we also assessed if users talk to each other about how the toilets are used by asking the question: “ How often do you talk to the other users of your toilet about the importance of keeping it clean?” The response scale went from 1, (almost) never to 5, (almost) always.

Personal norm: A personal norm relates to an individual’s feelings or internalized values to perform or not to perform a given behaviour or task (Ajzen, 1991, Harland et al., 1999, Perugini et al., 2003, Harland et al., 2007, Mosler, 2012). Personal norm was assessed with the question: ‘‘How important is it for you that the toilet you use is clean?’’ Responses on a scale of five ranged from not important at all to very important.

Ability: Ability factors relate to individuals' personal beliefs and confidence to perform a desired behaviour (Ajzen, 2002). This factor was measured by the question: ''How easy or difficult is it to keep the toilet you use clean?'' The responses ranged from very difficult to very easy.

Habit: A habit is a routine behaviour performed automatically or more less without thinking whether to perform it or not (Bargh and Chartrand, 1999, Kraemer and Mosler, 2010). This question was asked to measure whether shared toilet users perceived cleaning them to be a habit: ''Is cleaning the toilet you use something you do as a matter of habit?'' The responses ranged from not a habit at all to very strong habit.

Checklist

After completion of the household interviews, the interviewers did a checklist concerning the toilets of the respondents. The information recorded was: whether they were able to find the toilet the household uses (yes/no), the materials used to construct the toilet slab (wood/concrete or cement/concrete and ventilated/plastic/no slab at all), the cleanliness of the toilet slab (very dirty to not dirty at all) and whether the toilet was smelly or not.

Results

Of the 1019 respondents, 31.1% in Makindye municipal council used shared toilets, followed by 24.2% in Kawempe, 22.5% in Rubaga, 11.5% in Nakawa and 10.7% in Central. Only 11.1% to 16.7% of the respondents regarded their shared toilets as not dirty (*Table 1*). On the other hand, only 3.2% of the shared toilets were not dirty at all as observed by interviewers.

Table 1: Respondents' perceived dirtiness of shared toilets in each municipal council

Kampala municipal councils	Respondents perceived shared toilet cleanliness					
	Very dirty	Dirty	Quite dirty	A little bit dirty	Not dirty at all	Total
Central	2	25	15	48	18	108
	1.9%	23.1%	13.9%	44.4%	16.7%	100.0%
Kawempe	4	78	19	107	39	247
	1.6%	31.6%	7.7%	43.3%	15.8%	100.0%
Makindye	4	46	91	148	25	314
	1.3%	14.6%	29.0%	47.1%	8.0%	100.0%
Nakawa	0	17	40	47	12	116
	.0%	14.7%	34.5%	40.5%	10.3%	100.0%
Rubaga	3	38	55	114	19	229
	1.3%	16.6%	24.0%	49.8%	8.3%	100.0%
Total	13	204	220	464	113	1014
	1.3%	20.1%	21.7%	45.8%	11.1%	100.0%
	Observed cleanliness					
Central	6	45	18	27	0	96
	6.3%	46.9%	18.8%	28.1%	.0%	100.0%
Kawempe	19	74	11	65	5	174
	10.9%	42.5%	6.3%	37.4%	2.9%	100.0%
Makindye	19	98	90	70	13	290
	6.6%	33.8%	31.0%	24.1%	4.5%	100.0%
Nakawa	10	48	37	19	1	115
	8.7%	41.7%	32.2%	16.5%	.9%	100.0%
Rubaga	13	84	37	79	10	223
	5.8%	37.7%	16.6%	35.4%	4.5%	100.0%
Total	67	349	193	260	29	898
	7.5%	38.9%	21.5%	29.0%	3.2%	100.0%

Notes: Cross tabulation of respondents perceived and interviewers observed dirtiness of the shared toilets by municipal council divisions. N = 1014 for respondents perceived cleanliness and N = 898 for interviewer observations.

From the perspective of hygiene, most of the shared toilet rooms ranged from dirty to a little bit dirty (*Table 1*). A few respondents mentioned that their toilet rooms were not dirty. This was confirmed by the observations of the interviewers who reported that more shared toilet rooms were dirty than what respondents reported. The interviewers also observed that 60.1 % of the respondents' toilets smelt badly.

The majority of the respondents were female (75.8%), and shared toilets (rooms) with users from other households. The excluded respondents in this analysis (n = 481) were those who used private toilets, public toilets, or had no access to any toilet facility. 68.6% of the interviewed respondents were tenants, while 31.4% owned their homes. The mean number of people living in each household was 4.34 (min = 1 and max = 30). More than half (64.5%) of the respondents had children under five years of age living in their households (mean = 1.85, min = 1 and max = 12).

In regard to access to sanitation facilities, there were three times more users of shared toilets (67.9%) than those using private toilets. The mean number of toilet user households per room was 6.32 (min = 2 and max = 98). According to the respondents, more than half (61.7%) of the children less than five years of age used the same toilets as adults. Another common excreta disposal alternative for children of that age was the use of potties or small buckets.

The main reasons for the lack of cleanliness of the shared toilets was the lack of cleaning equipment (32%), no cooperation to clean toilets among user households (31.5%) and careless use, often leaving it dirty after use (29.2%). Slightly more than half (52%) of the shared toilets had no locks. This could be another reason why most of them are dirty since they are open and accessible to the public.

Most of the respondents reported having a strong intention to keep their toilets clean. 48.3% of them had a very strong intention and 40.6% a strong intention. Only less than 1% reported having no intention at all to keep their shared toilets clean. The most significant determinants of households' cleaning intention for shared toilets were: the perceived

importance to use a clean toilet, effortful behaviour, the ease to keep the toilet clean and the communication of the users with each other (*Table 2*).

Table 2: Cleaning intention linear regression

Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	.278	.322		.864	.388
Perceived vulnerability to get disease from using a dirty toilet	.054	.032	.063	1.686	.092
Attitude belief to use clean toilet	.004	.012	.012	.335	.738
Effortlessness cleaning shared toilet	.117	.021	.197	5.493	.000
Affective belief to use dirty toilet	.136	.042	.116	3.236	.001
Injunctive norm to leave toilet dirty	.019	.015	.045	1.298	.195
Talking frequency to toilet users	.091	.020	.160	4.457	.000
Personal norm to use clean toilet	.173	.025	.251	6.900	.000
Ability belief to keep shared toilet clean	.050	.010	.177	5.013	.000
Habitual toilet cleaning	.102	.024	.151	4.192	.000

Notes: N = 597, R^2 = .34, Adjusted R^2 = .33

Overall 34% of the variability in of the respondents' cleaning intention was predicted by the analysed variables. By order of importance from the standardized beta coefficients, respondents cleaning intention is influenced by personal norm to use clean toilet (β = 0.25), effortlessness cleaning shared toilet (β = 0.20), ability belief to keep shared toilet clean (β = 0.18), talking frequency to toilet users (β = 0.16), habitual toilet cleaning (β = 0.15) and affective belief to use a dirty toilet (β = 0.12).

From Table 2; personal the norm factor of perceived importance to use clean toilet (β = 0.25), attitude factors (disgusting to use dirty toilet (β = 0.12) and effortlessness in cleaning shared toilet (β = 0.20)) and cleaning habit (β = 0.15) have higher influence on respondents cleaning intention for the shared toilet facilities. This means that the more the perceived importance to

use a clean toilet or effortlessness to clean, the stronger the respondent's cleaning intention for the shared toilet. In addition, the more respondents perceived cleaning as a habit and using dirty toilet as disgusting, the stronger was the cleaning intention.

Discussion

To clean is a behavioural hygiene practice. While the lack of cleanliness of shared toilets is one of the reasons why they are considered unimproved, according to the United Nations Joint Monitoring Programme for Water and Sanitation (WHO/UNICEF, 2012), no clear definition of cleanliness exists. However, in a policy brief on shared sanitation by Günther et al. (2012), the authors state that a latrine is considered clean or acceptable if neither liquids, dirt, paper or mud are visible within the squatting area of the toilet. They maintain that if considerable amounts of solid material, such as excrement or liquids, are present in a toilet, it would be difficult to use without getting dirty (Günther et al., 2012). The results in this study suggest that most of the shared toilets in Kampala's slums are dirty. The slums in Makindye municipal council had the least facilities that were not dirty, while Kawempe slums had the dirtiest shared toilets (Table 1). Six of every ten shared toilets checked by the interviewers smelt badly. The inadequency of proper hygiene among the users of most shared toilets has been reported in a cross section of studies conducted in different urban slum settings in other developing countries (Bartlett, 2003, Tumwine et al., 2003, Gulyani and Talukdar, 2008). It is, therefore, important to know what determinants would influence cleaning intentions of the users of shared toilets so that they are kept hygienically clean.

Table 2 details the determinants found to significantly influence the cleaning intentions of shared toilet users. First, respondents' cleaning intention were very strongly associated with their perceived importance to use clean toilets. In this study, eight out of every ten household respondents who perceived using a clean toilet as very important also expressed strong intentions to engage in cleaning toilets. Thus, in slums where dwellers are informed and know

about the importance of using a clean toilet, there is a high likelihood that the people would have a motivation to keep them clean. Cleanliness is reported by slum dwellers as one of the most important attributes for a toilet to be considered as convenient and hygienically safe to use (Tumwebaze et al., 2012, Biran et al., 2011, Nyametso, 2012, Wegelin-Schuringa and Kodo, 1997).

Secondly, respondents' cleaning intention for shared toilets is significantly related to their perceived disgust about using dirty toilets. The respondents who perceived the use of dirty toilets as very disgusting had a very strong cleaning intention for shared toilets. Avoiding the disgust people feel when using a dirty or smelly toilet is one of the reasons why they desire to invest in, demand or build sanitation facilities (Jenkins and Sugden, 2006, Siu, 2006, Avvannavar and Mani, 2008). Sometimes, users who greatly dislike using a dirty toilet may offer to do regular cleaning, irrespective of whether others do not participate in doing so. A qualitative study on health, hygiene and appropriate sanitation conducted in some urban slums in three developing countries (Bangladesh, India, Kenya) reports on a case scenario of a single mother with children in Nairobi who often had to clean a shared toilet before her children could use it (Joshi et al., 2011). The experience of disgust, which is an affective reaction to a bad situation, can lead to the adoption of positive behaviour, i.e., the willingness to clean the shared toilet. Along with disgust is the understanding that cleanliness assists in the avoidance of the risk of contamination (Curtis and Biran, 2001, Rozin et al., 2005, Rosenquist and Emilia, 2005, Curtis, 2007).

Thirdly, respondents' cleaning intention for shared toilets is significantly related to how effortless they perceived it was to clean them. The more respondents perceived cleaning a shared toilet as needing much effort, the less they were likely to clean them. In this study, four out of ten household respondents mentioned that it was very effortful to clean a shared toilet. The reasons why some respondents mentioned it was effortful to do so could be related to the absence of cleaning materials or detergents, feeling a lack of responsibility from other users,

and the fact that, sometimes, even when one does the cleaning, the toilet can easily be dirtied by irresponsible users.

Furthermore, respondents' cleaning intention for shared toilets is significantly related to their cleaning habits. The stronger respondents perceived cleaning a shared toilet to be a habit, the stronger were their cleaning intention. In this study, about four out of every ten household respondents reported that cleaning a shared toilet was very much done as a matter of habit. Developing a habit towards cleaning shared toilets is important to be fostered among users and positively affects their cleaning intention, leading to actual cleaning of the toilets as well. The positive influence of developing a habit towards behaviour performance has been reported in some other studies such those on solar water disinfection (Kraemer and Mosler, 2010).

While cleaning a shared toilet may not seem desirable to some users, using a dirty toilet puts their health and safety at risk. Yet, shared toilet users who have no cleaning intention may be willing to pay for cleaning services provided by an entrepreneur. A study conducted in Mathare slum in Kenya reported that households sharing toilets had the option to pay a private entrepreneur to clean them (Thieme, 2010). If toilet sharing households took responsibility to pay for their cleaning, this would maintain their cleanliness too, as well as reduce the risk of exposure to disease causing agents associated with their use (Buttenheim, 2008, Rahman, 2006, Tumwine et al., 2002).

The frequency users of shared toilets speaking to each other significantly impacted on their cleaning intention. The more respondents talked to each other about the importance of maintaining the cleanliness of their shared toilets, the more likely they intended to clean them. Almost five of every ten respondents who reported that they always communicate with other users on the importance of keeping their shared toilet clean had very strong cleaning intention. Although slums are heterogeneous, with a diverse mix of cultures, they are socially united by virtue of sharing common resources like toilets (Joshi et al., 2011). This is why it is important

for users to develop a talking culture amongst themselves in order to make good use of their shared toilets, and to maintain them clean.

Implications to Practitioners and Researchers

According to the reported and observed cleanliness results, this study has shown that the engagement of shared toilet users to clean their facilities is still inadequate.

Secondly, the study has also shown that factors such as one's understanding of the importance of using a clean toilet, the perceived disgust from using dirty toilets and habit are essential in fostering users' cleaning intention for shared toilets.

This study also suggests that public health practitioners and, especially, those working in urban slum settings, should prioritize and integrate hygiene promotion in their work. In terms of the perspective of hygiene, while the promotion of hand washing with soap is crucial, emphasis on the importance of maintaining the cleanliness of shared toilets should also be stressed in order to improve the health of the residents. However, more user-focused scientific research in the area of cleaning behaviour is recommended in order to assist public health practitioners in the designing of promotion and sensitization messages about the importance of cleaning shared toilets.

Conclusion

The results of this study indicate that factors, such as the importance to use a clean toilet, the perceived disgust from using dirty toilets and habit, are essential in fostering the cleaning intention of users of shared toilets. It would be useful to keep these and other factors in mind when designing promotional and sensitization messages concerning engaging shared toilets users in cleaning such toilets.

The use of clean toilets, along with other hygiene practices, such as hand washing with soap, will reduce the risk of exposure to infections in the urban slums of developing countries.

Study 2: Why clean the toilet if others don't? Using a social dilemma approach to understand users of shared toilets' collective cleaning behaviour in urban slums: a review

Abstract

Shared toilets are a common good in urban slums, but need to be maintained and cleaned for users to positively benefit from having access to them. Collective participation of the shared toilet users is required to keep them clean and ensure adequate hygiene. However, users' decisions on whether to participate or not in the cleaning of the shared toilets are a social dilemma. If each of the shared toilets' users decided not to participate in their cleaning, the facilities could end up in a deteriorated unhygienic state and become a health risk to them and to the community at large. In this paper, we provide an overview of the social dilemma approach and highlight how the factors important in the management of social dilemmas can be relevant to understanding the cleaning behaviour of shared toilet users in urban slums.

Key words: Cleaning, Collective action, Cooperation, Shared toilets, Social dilemma, Urban slums

Introduction[2]

Recent studies show an increasing trend in the use of shared toilets as the most accessible and viable sanitation option in developing countries' urban slum settlements (Schouten and Mathenge, 2010, WHO/UNICEF, 2012, Mazeau et al., 2013). They have been found to be the most viable for slum areas despite the space limitations caused by ever increasing population in these areas (McFarlane, 2008, Schouten and Mathenge, 2010, Katukiza et al., 2012, UN-Habitat, 2012). However, one of the reasons why shared toilets are still classified as unimproved by the United Nations Joint Monitoring Programme for Water and Sanitation is the lack of cleanliness and acceptability (WHO/UNICEF, 2012). Dirty toilets are common in urban slums (Tumwebaze et al., 2012) and limit the health and social benefits derived from having access to these facilities (Tumwine et al., 2002, Jenkins and Scott, 2007). In most urban slums, a toilet is often shared by different families (Karn et al., 2003, Gulyani and Talukdar, 2008), and normally there are some users who do not cooperate in its cleaning (Tumwebaze et al., 2014, Wegelin-Schuringa and Kodo, 1997). Their decision to not help with the cleaning and to use the facilities while dirty exposes themselves and others to the risk of contracting diseases, such as diarrhoea (Tumwine et al., 2002, Rahman, 2006, Buttenheim, 2008). In addition, an individual's decision to leave a shared toilet dirty can cause inconvenience, disgust and/or conflict with the other users (Curtis and Biran, 2001).

While there is greater use of shared toilets, especially in Sub-Saharan Africa, it is widely recognised that it is important to keep them clean (Biran et al., 2011, Nyametso, 2012). Shared toilets encompass a range of facility types (communal, public, or semi-private) and these vary within and between settings (Mazeau et al., 2014). In this literature review, we define shared toilets to be facilities to which access is restricted to a limited number of user households within the same compound or households close to each other (Mazeau et al., 2013). Furthermore, we

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define a shared toilet with restricted access as a 'common good' as opposed to a 'public good', which in the case of shared sanitation means a communal and public toilet. The restricted number of user households of shared toilets makes them suitable for analysis based on the study of social dilemmas. The safe use of a common good (shared toilet) is interdependent with the sharing user households' collective cooperation to participate in keeping the toilet clean. It is this interdependence, that individuals have to make cleaning choices on whether to participate in cleaning or not, that leads to social dilemmas (Foddy et al., 1999, Chen et al., 1996).

Hitherto, very few studies have focused on the behaviours of users and their cleaning of shared toilets. More empirical research is warranted that deals with how to resolve the dirty state of shared toilets and can help to promote how users can take a lead role in their cleaning. The objective of this paper is to show that the cleaning of shared toilets is a social dilemma that can be explained from the social dilemma context.

Social dilemmas

The most widely used definition of social dilemmas is that proposed by Dawes (1980), who defines social dilemmas as situations characterized by two main properties:

iii. the social payoff to each individual for defecting (non-cooperative) behaviour is higher than the payoff for cooperative behaviour, regardless of what the other society members do, and

iv. all individuals in the society receive a lower payoff if all are non-cooperative than if all cooperated.

In the case of the cleaning of shared toilets, each user is in the social dilemma:

iii. If he or she does not participate in cleaning, then he or she is better off because he or she does not have to make an effort to clean, but benefits from the cleaning of others.

iv. However, if many or all users do not participate in cleaning, then all users of the shared toilet suffer from the harm caused by being exposed to the risk of contracting diseases.

Social dilemma research has focused mainly on prisoner's dilemmas, commons dilemmas and public goods dilemmas. Commons and public goods dilemmas are the aspects analysed in this paper to understand the cleaning behaviour of shared toilet users.

Public goods dilemmas focus on resources or services that can be enjoyed by all members of a group or society regardless of their contribution (Sheizaf and Larose, 1993, Brown-Kruse and Hummels, 1993). While it could be in each individual's interest not to pay for these services, but to still have access to them, if all individuals decided not to pay for such services, they are likely to collapse (Balliet, 2010). Some examples of public goods include: roads, transport, education and health services, among others. Most shared toilets in slums are provided by the owners of the households (Mazeau et al., 2013). As such, some users show no responsibility in their cleaning or reason that it is the role of the household owners to clean the shared toilets since they pay rent (Wegelin-Schuringa and Kodo, 1997, Tumwebaze, 2014). Thus, public goods dilemma resolution factors such as trust, group identity, cooperation and norms could be essential in understanding the cleaning behaviour of shared toilet users.

Commons dilemmas originate from the tragedy of the commons (Hardin, 1968). They are based on the paradox about the grazing patterns of herdsmen from a community who share a common resource (grazing land) that they over grazed, leading to its depletion (Hardin, 1998). According to Ostrom et al. (2002), the tragedy of the commons is central in human ecology and the study of the environment. Examples of commons dilemmas include, but are not limited to, depletion of water sources and forests, environmental pollution, and poor solid waste and excreta disposal. Shared toilets can become an environmental and health hazard if poorly used or not kept clean (Tumwine et al., 2002, McFarlane, 2008).

Cooperation and collective action in social dilemmas

Cooperation - manifested by individuals making decisions that support collectivism is important to sustain resource use and/or ensure the durability of public goods (Olson, 1965,

Ostrom, 1998, Ostrom, 2000, Vanvugt and DeCremer, 1999). Likewise, cooperation among users of shared toilets to participate in their cleaning is important to maintain the cleanliness of the facilities. Unfortunately, research has shown that individuals often make non-cooperative decisions regardless of their effect on others, even when the aggregate harm is greater than the profit attained by an individual alone (Kopelman et al., 2002). Understanding the influencing factors of cooperation and collective action in public and common goods dilemmas could be of relevance to the collective cleaning of shared toilets.

Methods

The data about publications on social dilemma and collective cleaning of shared toilets were compiled through key word searches in existing databases and recommendations from colleagues with knowledge on the topic. The key search words used were: social dilemma, cleaning, collective action, cooperation, and shared sanitation and hygiene. During these searches, key word combinations were done according to each of the social dilemma factors discussed. Majorly, Scopus and Web of Science Data libraries and Google Scholar searches were done for this article. One limitation of Google Scholar, however, is that it has no advanced search function and does not provide distinctive identification numbers for the articles. Yet, it does provide a good supplement to main data libraries and to articles published by major publishers, such as Elsevier, Springer, Taylor and Francis and Wiley.

Discussion of social dilemma factors and application to users' cleaning of shared toilets

The concepts presented in this section are from papers on the factors influencing cooperation in commons dilemmas (Kopelman et al., 2002), a conceptual review of decision making in social dilemmas (Weber et al., 2004) and social dilemmas (Dawes, 1980).

Group size

The size of a group has an influence on individual decisions' manifestation of cooperative or non-cooperative behaviour (Bonacich et al., 1976). Some studies, such as those comparing three to seven groups or more, contend that cooperation is greater in smaller than bigger groups, and that the likelihood of individuals to make decisions that benefit group interests is higher in smaller groups (Hamburger et al., 1975, Isaac and Walker, 1988, Marwell and Schmitt, 1972, Bonacich et al., 1976). Most studies report that the level of cooperation and self-efficacy declines with the increase in group size (Fox and Guyer, 1977, Liebrand, 1984).

The effect of group size as used in commons and public goods social dilemmas could be comparable to the cleanliness challenge of toilets shared by a big number of families in urban slums (Karn et al., 2003, Bartlett, 2003, Gulyani and Talukdar, 2008). One of the principal reasons why the Joint Monitoring Programme for Water and Sanitation characterizes shared toilets as unimproved is inadequacy in terms of their cleanliness and acceptability (UNICEF and WHO, 2012). However, in the recently proposed post-2015 targets and indicators for drinking-water, sanitation and hygiene, shared toilets can be considered improved if shared by not more than five households (WSSCC, 2014). A sanitation study conducted in Kampala slums in Uganda found that the greater the number of families sharing a toilet, the less likely were the facilities to be clean (Günther et al., 2012). Facilities were more likely to be cleaner if they were shared among fewer households (Tumwebaze, 2014). Similarly, findings from a study conducted in Bangladesh on the challenges of local environmental problems facing the urban poor reported that cleaning is one of the sanitation challenges in situations where a single communal toilet was being shared among more than 10 to 20 families (Rahman et al., 2010).

Group dynamics

The nature of individuals' groups, their developments and interactions influences the way they behave in social dilemma situations (Moreira et al., 2013). Weber and colleagues report in a conceptual review on decision making that group associations and identifications are important

social features in social dilemmas. Individuals often behave differently when in groups than when alone (Weber et al., 2004). In groups where individuals have strong associations amongst each other, trust and cooperation is high, and may result in the prioritization of collective actions or individuals restraining themselves for the collective good of the group (Kramer et al., 1986). However, group dynamics have also been found by researchers to perpetuate the free-rider syndrome such as in public goods dilemmas, where some individuals, for instance, may not want to pay the taxes that are meant to help in the provision of public services of which they are beneficiaries (Erev et al., 1993).

From a sanitation perspective, the heterogeneous and transient nature of users of shared toilets in urban slums might compound their relationship with other households in regard to the cleaning of the shared toilets (Isunju et al., 2011, Joshi et al., 2011). The rural-to-urban movement of some slum dwellers or the regular changing of living locations within slums on the part of some families may impede the development of social relationships among the users of shared toilets that could support their collective cleaning behaviour (Miah and Weber, 1991, Okot-Okumu and Oosterveer, 2010, Schouten and Mathenge, 2010).

Gender

Most gender studies show that women are more likely than men to be cooperative when dealing with social dilemmas (Stockard et al., 1988, Sell et al., 1993, Nowell and Tinkler, 1994, Cadsby and Maynes, 1998). Summary findings from some studies show that; strong cooperation exists in more female groups than in male or mixed groups (Nowell and Tinkler, 1994), that women are more likely than men to cooperate (Stockard et al., 1988) and that women were found to have more cooperative behaviour in negotiations than men (Walters et al., 1998).

As reported in social dilemma studies, women have also been found to have more influence than men in the management of water and sanitation services (Assaad et al., 1994, MoWE, 2009). For instance, women play a more influential role in ensuring good hygiene practices within the home or even in the cleaning of the shared toilet facilities in slums than

men (Elmendorf and Isely, 1983, Zwane and Kremer, 2007, Graf et al., 2008). However, a sustainable management system of shared toilets by users in urban slums needs the active involvement of both men and women (Mara, 2003, Hanchett et al., 2003).

Attribution

Attribution refers to individual inferences about the causes of certain events or behaviours (Duncan, 1976, Blount, 1995, Stouten et al., 2006). In a study on information preferences and the corresponding consumption behaviour in common pool resource management, the authors found that individuals' decisions to voluntarily restrict consumption in resource crises among other things depended on what they believed caused the scarcity (Brucks and Mosler, 2011). Similarly, a study conducted in California when there was a severe drought found that people who believed that the water shortages were due to natural climatic conditions restricted their use of water to the optimal limits, while those who thought that the cause had been induced by other people did not (Talarowski and McClintock, 1978).

In the field of sanitation, a number of preventable diseases such as diarrhoea are attributed to the lack of adequate sanitation and hygiene (Ezzati et al., 2002, Kumar and Subita, 2012, Bartram and Cairncross, 2010). Yet, some residents in urban slums may not prioritize engagement in hygiene practices, such as the cleaning of shared toilets if they think it is not their duty to clean or if this arrangement is compounded by other limitations, such as lack of water or cleaning equipment (Wegelin-Schuringa and Kodo, 1997, Bapat and Agarwal, 2003, Hanchett et al., 2003). However, they might be more disposed to participate in cleaning when informed that the dirty state of the toilet originates from the unintended non-cleaning of others due to the carelessness of young children or the inability of sick users to participate in cleaning (see unintended non-cooperation).

Social motives

Social motive factors arise when individuals take into consideration others' outcomes when making choices (Maccrimmon and Messick, 1976). Social motives that affect the way

individuals cooperate in social dilemmas are: altruism (motivation to maximize other individual's gains), competition (individual motivation to maximize relative gains by working against the interests of other individuals in the group to which he or she may belong), cooperation (motivation to maximize joint gains) and individualism (maximization of one's own individual gains without working with the other individuals in the group in which he or she may belong) (McClintock, 1972, Liebrand, 1984, Liebrand and van Run, 1985, Kopelman et al., 2002). Most evidence on social motives shows that people with high individualistic and competitive traits are more aggressive in making self-gains than people with cooperative and altruistic characteristics (Kramer et al., 1986, Roch and Samuelson, 1997, Kopelman et al., 2002). A study on the effects of social motives on behaviour across two cultures (i.e., Americans and Dutch) looking at altruism, cooperation, competition and individualism, found that cross-cultural differences existed in regard to the distribution of social motives. Whereas in Holland the percentage of altruistic and cooperative individuals was 50-60%, in America these percentages ranged from 26% to 40%.

In the context of sanitation and hygiene, understanding individuals' social motives and how they might influence the maintenance and cleanliness of shared sanitation facilities is important. Social motives are manifested by the willingness of the users of shared toilets to directly participate in their cleaning and/or maintenance (Burra et al., 2003, McFarlane, 2008, Roma et al., 2010, Thieme, 2010). The cleaning management of a toilet depends on the proportion of co-operators to non-co-operators who share a toilet. If co-operators dominate, then self-management of the user group can be successful. However, if non co-operators prevail, then the user group will be better off by engaging a cleaning service.

Social norms

Social norms are the embodiment of collective beliefs and values that impact how people behave and/or interact within certain groups or settings (Bicchieri, 2006). Evidence from a number of studies shows that social norms are instrumental in fostering cooperation among

people faced with social dilemmas (Biel et al., 1999, Bicchieri, 2002, Thøgersen, 2008). In a study by Biel and Thøgersen (2007) on the activation of social norms in social dilemmas, it is reported that social norms often guide behaviour in specific contexts. The authors also state that it is necessary to frequently activate the norms so that people keep following them (Biel and Thøgersen, 2007). Thus, chances are high that if a group of individuals have some binding social norms, decisions made by such individuals are more likely to be collective than in situations where social norms are less significant (Steg and Vlek, 2009). However, it is worth mentioning that social norms may be injunctive – approved behaviours by important others or institutionalized, descriptive – performed behaviours or personal norms – self-internalized behaviours performed as personal obligations (Mosler, 2012, Fishbein and Ajzen, 2010, Thøgersen, 2008). Some studies have reported on the strong relationship of personal norms with cooperation (Bratt, 1999, Thφgersen, 1999). It is argued that people may conform to a social norm if they find it legitimate or reasonable, and not necessarily because of fear or sanctions (Dawes, 1980, Thøgersen, 2008).

In sanitation, a wide range of studies have shown that social norms are important in health promotions, or the adoption of health-related behaviours (Pinfold, 1999, Rosenquist and Emilia, 2005, Mahon and Fernandes, 2010, Rheinländer et al., 2010, Curtis et al., 2011). Tumwebaze and colleagues (2014), in their study on the determinants of households' cleaning intentions for shared toilets found that individuals cleaning of shared toilets significantly related to their perceived personal norms to use a clean toilet. In situations where certain social norms may constrain people's adoption of health behaviours or hygiene practices, such as hygienic maintenance of shared toilets, researchers have pointed out the need to develop health-protecting social norms or changing existing norms to support the promotion and adoption of health behaviours (Mosler, 2012, Bartram and Cairncross, 2010, Curtis et al., 1997, Curtis et al., 2009, Waterkeyn and Cairncross, 2005).

Social identity

Social identity refers to the perception of oneness within a group (Blake and Fred, 1989). An individual's social attachment or sense of belonging determines their level of cooperation in a given situation. Blake and Fred (1989) argue that social identification leads to activities that correspond to identifying with and supporting institutions, thereby, reinforcing the antecedents of identification. A study by Dawes et al., (1988), on the importance of group identity in cooperation, contends that consensus by subjects promising to cooperate was an important indicator of social identity and could in it-self be a sufficient condition to elicit cooperation among individuals (Dawes et al., 1988). Cooperation and collectivism are, thus, rooted in a coherent sense of social belonging (Van Zomeren et al., 2008).

Likewise, the strength of social identity among slum residents who share toilets could be essential in enhancing individual tendencies to collectively participate in toilet cleaning in users who have shared norms or who value cleanliness (Crook and Ayee, 2006, Hulland et al., 2013). This is because social identities shape relationships within groups and can reinforce collective initiatives (Moffat and Finnis, 2005, Alcock et al., 2009). However, in situations dealing with transient slum dwellers, the establishment of solid social identities and the creation of collective institutions, such as those required concerning the cleaning of shared toilets, may be difficult and challenging (Joshi et al., 2011, Owusu, 2010, De-Graft Aikins and Ofori-Atta, 2007, Appeaning Addo, 2013).

Behaviour of others

Various studies show that individuals make decisions regarding the way they behave depending on how they perceive or interpret the behaviour of other individuals in dilemma situations (Fujii and Yanagida, 2005, Bogaert et al., 2008, Brucks and Mosler, 2011, Nettle et al., 2011, Balliet and Van Lange, 2013, Declerck et al., 2014). This is because human decisions occur in settings where the choices of two or more interdependent actors have strong implications on both their outcomes and those of others (Liebrand, 1984).

Likewise, Kelley and Stahelski's (1970) study on social interaction as the basis of co-operators' beliefs about others, argue that several plausible assumptions lead to the deduction that co-operators and competitors will have different beliefs about what other people are like in respect to cooperativeness and competitiveness. The authors report that when cooperative and competitive people interact, the cooperative individual tends behaviourally to become like the competitive one. Because of this behavioural change, the competitor misjudges the co-operator, taking him to be competitive, and the co-operator and not the competitor is aware of the latter's dominant role in their relationship. The co-operators will believe that others reciprocate their cooperativeness as opposed to competitiveness, while competitors will believe that other people are uniformly competitive (Kelley and Stahelski, 1970).

Evidence from studies dealing with total sanitation shed light on how collective mechanisms can steer individuals to adopt sanitation and hygiene behaviours (Pattanayak et al., 2009, Whaley and Webster, 2011, Engel and Susilo, 2014). However, no studies were found that directly looked at the link between the users of shared toilets and their participation in their cleaning. This is a field that would, thus, benefit from more evidence based research. It would be interesting to find out, for instance, how co-operators react when other users of the shared toilet are not cooperative in cleaning, and if non co-operators would change their ways and participate in cleaning due to other users cooperation.

Communication

The role of communication in enhancing cooperation among individuals and collective decision making is reported to be a key factor in social dilemmas (Bouas and Komorita, 1996, Balliet, 2010). It is also important in understanding how cooperation or group relationships influence decision making processes (Bornstein et al., 1989). The reinforcement of group identity feelings and the commitment to cooperate is said to be the most important function of communication in resolving social dilemmas (Kerr and Kaufman-Gilliland, 1994). Literature shows that the content of messages is a potent factor in resolving social dilemmas (Thompson and Stoutemyer,

1991). Face-to-face communication is reported as more effective in cultivating and strengthening cooperation than e-mails, depending on the nature of the decisions to be made, their content and the complexity of the issues (Frohlich and Oppenheimer, 1998). Frohlich and Oppenheimer's findings are also similar to that of a review study by Balliet (2010) on communication and cooperation, in which Balliet found communication to have a large positive effect on cooperation, with face-to-face communication having a stronger effect than written messages.

Similarly, the importance of communication is reported in a number of sanitation and hygiene studies (Pinfold, 1999, Bajracharya, 2003, Curtis, 2003). These studies highlight appropriate communication channels, communication skills and knowledge as crucial to the fostering of desired sanitation and hygiene behaviour (Curtis et al., 2001, Lüthi et al., 2009, Schouten and Mathenge, 2010). However, research is still needed to better understand the modes of communication among users of shared toilets in urban slums and its influence on their collective cleaning behaviour.

Trust

Trust may be defined as the confidence, faith or predictability an individual has about others (Jonker and Treur, 1999). Rothstein (2000), in his article on trust, social dilemmas and the strategic construction of collective memories, contends that trust is needed to move from non-cooperative to cooperative states (Rothstein, 2000). In a study on the influence of trust, accountability, and self-monitoring on decision makers' willingness to contribute to a public goods dilemma experiment, the authors found that strong perceptions of trust, high accountability and self-monitoring had a positive impact on individuals' willingness to cooperate (De Cremer et al., 2001).

Likewise, encouraging trust among users of shared toilets is important to improve their cleaning cooperation. If a toilet user highly trusts that other sharing families will participate in keeping the shared toilet clean, he or she might be cooperative in cleaning it as well. While trust

has been mentioned in different sanitation and hygiene studies as important (Chitekwe-Biti, 2009, Roma et al., 2010, Schouten and Mathenge, 2010, Hendriksen et al., 2012), further research is needed on the linkage of trust with participation in the cleaning of shared toilets.

Unintended non-cooperation

Unintended situations sometimes affect the way individuals interact or cooperate in certain situations (Van Lange et al., 2002, Tazelaar et al., 2004). A study on how to overcome the detrimental effects of unintended non-cooperation in social dilemmas found that unintended non-cooperation often may lead to interpersonal misunderstanding or discrepancies between the intended and actual outcomes of an interaction partner (Van Lange et al., 2002). For instance, arriving late for an appointment due to unexpected traffic could lead one to interpret that as a sign of uncooperativeness (Van Lange et al., 2002). It is reported that negative unintended situations exert detrimental effects on the impressions of partners' benign intent and cooperation. This was found in a study that examined whether unintended non-cooperation exerted detrimental effects on impressions and cooperation (Tazelaar et al., 2004). The authors also found that such detrimental effects could be effectively reduced by communication (Tazelaar et al., 2004).

Concerning sanitation and hygiene, circumstances may arise outside the control of individuals that may limit their performance of expected responsibilities. These might include homelessness, lack of funds and ignorance (Burra et al., 2003, Magadi et al., 2003, De-Graft Aikins and Ofori-Atta, 2007, Owusu, 2010, Patel et al., 2013). For example, while a user of a shared toilet may have the desire to clean on a given day, the lack of water available may be a limiting factor, since water shortage is a common problem as cited in some studies (Graf et al., 2008, Thieme, 2010, Stoler et al., 2012).

A main limitation for this paper is that, although much literature can be found dealing with social dilemmas, not much exists on the cleaning of shared toilets. Also, it was found that much research on socio-cognitive behavioural determinants has a limited focus. While a

number of social dilemma studies on the influence of social norms on individual decision making exist, they mostly do not take into account such cognitive determinants as risks, attitudes, injunctive norms (influence of persons individuals consider important in their lives), ability and self-regulation. However, the factors discussed in this paper, when combined with the study of other related determinants, such as socio-cognitive factors, could lead to more holistic findings and guide the focus of interventions aimed at improving shared toilet hygiene through the promotion of collective shared toilet users' participation in their cleaning. In addition, this paper will help to fill the knowledge gap by providing information relevant to social dilemma reviews and/or field investigations regarding the cleaning behaviour of shared toilet users and/or general hygienic maintenance of shared toilets.

Conclusion

Shared toilets are a common good in developing countries' urban slums and their cleaning requires the collective participation of all user families. In this paper, we have presented the social dilemma factors important to understanding the collective cleaning behaviour of shared toilet users in urban slums. With the proposed inclusion of shared toilets (if shared not more than five families) into the post-2015 millennium development goals (MDGs) for drinking-water, sanitation and hygiene, further field research and interventions are important to promote the collective cleaning of shared toilets by user families.

Study 3: Shared toilet users' collective cleaning and determinant factors in Kampala slums, Uganda

Abstract

Introduction

Dirty shared toilets are a health risk to users in urban slum settlements. For health and non-health benefits among users of shared toilets to be guaranteed, their cleanliness should not be compromised. Using the RANAS (risks, attitudes, norms, ability and self-regulation) model and factors derived from the social dilemma theory, the objective of this study was to investigate the cleanliness situation of shared toilets in Kampala's slums and the psychological and social dilemma factors influencing users' cleaning behaviour and commitment.

Methods

We conducted a cross-sectional study in three slums of Kampala between December 2012 and January 2013. Data was collected from 424 household respondents that were primarily using shared toilets. Semi-structured questionnaires administered through face-to-face interviews were used in data collection. Linear regression was done for the multivariate analysis to test for the association between respondent cleaning behaviour and a combination of RANAS and social dilemma predictors.

Results

Out of 424 respondents interviewed, 44.3% reported cleaning the shared toilet daily, 34.4% once or several times a week, 1.4% every second week, 5.4% once or several times a month and 14.4% were not participating in cleaning at all. The main RANAS factors significantly ($P<0.05$) associated with respondents' cleaning behaviour were: attitudinal affective belief associated with cleaning a shared toilet ($\beta = -0.13$), self-regulation factors such as coping planning ($\beta = 0.42$), commitment ($\beta = 0.24$) and remembering ($\beta = 0.10$). As regards social dilemma factors, only the social motive factor was statistically significant ($\beta = 0.15$). The R square for the linear model on factors influencing cleaning behaviour was 0.767 and R square for factors influencing cleaning commitment was 0.699.

Conclusion

The RANAS factors provide a more robust understanding of shared toilet users' cleaning behaviour than social dilemma factors. Very important for interventions and changing the mind-set of shared toilet users to collectively participate in their cleaning are the self-regulation factors and changing the negative affective cleaning feelings. In addition to RANAS, social dilemma factors have an important influence on slum residents' commitment to clean their shared toilets.

Key words: Collective cleaning, shared toilets, urban slums

Introduction [3]

Globally, it is estimated that 2.5 or more billion people lack access to improved sanitation facilities (Clasen et al., 2012, WHO/UNICEF, 2013). This sanitation deficit continues to leave the public exposed to a wide range of faecal contaminants responsible for a multitude of diseases, especially in densely populated slums (Gilbert, 2007). It is estimated that 4.2% or more of annual global mortality would be prevented if all people had access to safe drinking water, reliable sanitation and decent hygiene practices (Prüss et al., 2002, Bartram and Cairncross, 2010). While some people lack total access to sanitation infrastructure, for others, it is a question of access to clean sanitation facilities. Using a dirty toilet exposes a user to the risk of contracting diseases such diarrhoea and other intestinal and respiratory infections. The challenge of cleanliness is most prevalent in urban slums where several families share limited toilet facilities, for example more than 10 families sharing one toilet stance (room) (Buttenheim, 2008, Maksudur Rahman et al., 2010, Tumwebaze et al., 2014). For cleanliness of the shared toilets to be guaranteed, it is imperative that user families are cooperative and collectively engage in their cleaning.

However, while there is a lot of research around sanitation and its linkage to a wide range of preventable diseases (Prüss et al., 2002, Bartram and Cairncross, 2010), evidence on the cleaning behaviour of shared toilet users is still inadequate. It is important that more researchers and practitioners explore this area that is fundamental to public and environmental health, especially in low income urban areas. We argue that performance of a behaviour, such as individual cleaning of a shared toilet can be explained largely by psychosocial determinants and understanding of the influence of the social dilemma factors. The psychological determinants are itemized by Mosler (2012) in the RANAS model of behaviour change – one of the few models applicable to a wide range of water, sanitation and hygiene practices and

[3] This study is submitted: Tumwebaze, I. K., and Mosler, H.-J. (submitted). Shared toilet users' collective cleaning and determinant factors in Kampala slums, Uganda. *BMC Public Health*.

interventions (Dreibelbis et al., 2013). The RANAS model synthesizes different social and health psychology theories and models. It provides a structured approach for assessing, understanding and explaining human behaviour, as well as designing, implementing and evaluating behaviour change related interventions.

The RANAS model is primarily divided into five conceptual block factors, with each having a set of measurable variables: risks, attitudes, norms, ability and self-regulation factors (Mosler, 2012).

Risk factors (Rosenstock, 1974) relate to a person's perceived vulnerability of contracting a disease, severity and consequences associated with the disease if contracted, and factual knowledge on disease exposure agents and how they can be prevented (Floyd et al., 2000).

Attitudinal factors denotes a person's inclination to respond to a behaviour with some degree of liking or dislike for the behaviour (Fishbein and Ajzen, 2010). Attitudinal factors can be categorized into instrumental and affective beliefs. Instrumental beliefs are outcome expectancies such as beliefs on costs in terms of money, time, effort and benefits associated with a desired behaviour (Eagly and Kulesa, 1997, Huber et al., 2013, Tumwebaze et al., 2014). Affective beliefs are feelings developed from thinking about a behaviour or its performance (Trafimow and Sheeran, 1998, Giner-Sorolla, 2001, Crano and Prislin, 2006).

Normative factors constitute of descriptive norms that reflect perceptions on behaviours typically performed by others, injunctive norms that show perceptions on behaviours typically approved or disapproved by people an individual considers important in their lives (Cialdini et al., 2006, Schultz et al., 2007).

Ability factors reflect a person's confidence and belief to perform a behaviour (Ajzen, 2002, Bandura, 1990). Performance of a desired behaviour also needs a person to have traits of positive self-efficacy. This means abilities to organise and execute the courses of action required to manage potential conditions, such as dealing with barriers that arise during the

performance of the behaviour and recovery from setbacks (Vries et al., 1988, Bandura, 2004, Schwarzer, 2008). One major precondition of ability factors is action knowledge an assumption that one knows how to perform the desired behaviour (Frick et al., 2004).

Self-regulation factors take precedence after the behaviour is in place and being performed but needs sustainability over time (Bandura, 2004, Schwarzer, 2008). To consistently perform a desired behaviour, an individual should have the ability to manage conflicting goals and distracting situations (Gollwitzer et al., 2005, Gollwitzer and Sheeran, 2006). Self-regulation factors involve: action control (strategy for continuous standard evaluation of on-going desired behaviour) (Schwarzer, 2008), action planning (perceived thoughts on how to set up the behaviour and remembering and commitment to perform the desired behaviour (Tobias, 2009).

Each of the above RANAS model factors can be assessed using a structured questionnaire and may involve a set of variables for each factor (see Mosler, 2012).

On the other hand, social dilemmas are conflict situations characterised by decision making processes, with most individuals making decisions that foster self-interests rather than those of groups they belong (Liebrand et al., 1992, Thøgersen, 2008). Yet, individuals would be better off making decisions that have benefit to the whole group (Dawes, 1980). For instance, in the case of cleaning of shared toilets, if all users of the shared toilet decided not to clean it, they all receive lower payoff such as being exposed to the risk of diseases from the dirty toilet. Thus, the interest of integration of social dilemmas in this paper is on users of shared toilets' cooperation, collective action and commitment (Vanvugt and DeCremer, 1999, Ostrom, 2000) in their cleaning. As reported in some studies, proper hygiene practice is important to avert the risks of contracting diseases associated with unhygienic situations such as using dirty toilets (Mara, 2003, Curtis, 2003, Bartram and Cairncross, 2010). Sanitation research from the social dilemma perspective is still limited. Only a few studies were found that indirectly looked at the

influence of some social dilemma factors such social norms on adoption of health behaviours (Pinfold, 1999, Mahon and Fernandes, 2010, Rheinländer et al., 2010, Curtis et al., 2011).

In this study, we investigate the influence of social dilemma factors, such as group size, attribution, social identity, social motives, social norms, behaviour of others and communication on collective cleaning behaviour of shared toilet users.

Firstly, the size of groups has been reported in a number of studies to have an influence on individuals cooperation in social dilemma situations (Hamburger et al., 1975, Bonacich et al., 1976). The studies contend that the degree of cooperation declines with the increase in the size of the groups (Fox and Guyer, 1977, Liebrand, 1984). This argument is also evidenced in different sanitation studies that have shown the linkage between dirty shared toilets and the big number of user families (Bartlett, 2003, Rahman et al., 2010, Tumwebaze, 2014).

Secondly, attribution in social dilemmas, relates to individual decision making processes based on what is believed to be the cause of certain undesirable situations (Blount, 1995, Stouten et al., 2006, Brucks and Mosler, 2011). For example, a study in California found that people restricted their water consumption to optimal limits during the drought period if they believed it was caused by natural climatic conditions and not induced by others (Talarowski and McClintock, 1978).

Thirdly, social identity is reported to positively influence cooperation among individuals for example in groups, or in this case, as would be among users of a shared toilet to participate in cleaning, if they feel a sense of belonging or oneness as users of the toilet (Dawes, 1980, Blake and Fred, 1989, Van Zomeren et al., 2008).

Fourthly, social motive factors involve individual consideration of other people's benefits while making individual decisions (Maccrimmon and Messick, 1976, Liebrand, 1984, Kramer et al., 1986). Social motives among users of shared toilets could be manifested in their selfless cooperation in maintaining the cleanliness of shared toilets (Burra et al., 2003, McFarlane, 2008, Thieme, 2010).

Fifthly, social norms are reported in a number of studies as key in encouragement of cooperation as long as people of shared beliefs and values that guide the way they behave or relate with each other (Biel et al., 1999, Bicchieri, 2002, Thøgersen, 2008). For example, social norms are reported important in the promotion of health behaviours, especially in the field of sanitation and hygiene (Waterkeyn and Cairncross, 2005, Mahon and Fernandes, 2010, Curtis et al., 2011).

Furthermore, the behaviour of individuals as manifested in their decisions on whether to cooperate or not in social dilemma situations is influenced by their interpretations and observations of the behaviour of other persons in the same settings (Fujii and Yanagida, 2005, Bogaert et al., 2008, Nettle et al., 2011). Individuals are more likely to develop a cooperative behaviour if most of the others are cooperative (Declerck et al., 2014).

Lastly, communication has a cardinal influence in promoting cooperation and resolution of conflict situations as reported in a number of studies (Bornstein et al., 1989, Thompson and Stoutemyer, 1991, Kerr and Kaufman-Gilliland, 1994, Bouas and Komorita, 1996, Balliet, 2010). The importance of communication and using appropriate communication channels has also been of interest in sanitation and hygiene studies (Val Curtis and Cairncross, 2003, Curtis et al., 2001, Lüthi et al., 2009).

The objective of this study was to investigate the cleanliness situation of shared toilets in Kampala's slums and the psychological and social dilemma factors influencing users collective cleaning behaviour and commitment. However, while shared sanitation facilities take a broad spectrum of communal, public and specific household shared facilities, our study concentrates on the latter. Specific household shared facilities are commonly used by households known to each other – belonging to one or more housing blocks and geographically defined (Tumwebaze et al., 2012, Mazeau et al., 2013, Mazeau et al., 2014).

Methodology

Study origin and design

This cross-sectional study was conducted between December 2012 to January 2013, among users of shared toilets in three slums in Kampala. It builds into the user-driven sanitation survey conducted in 2010 that assessed the sanitation situation in 50 slums of Kampala. The findings from the 2010 survey showed that more than half of the 1500 interviewed respondents were using dirty toilets (Tumwebaze et al., 2012). Most of the dirty toilets were those used by more than one family (Tumwebaze et al., 2014). Thus, this study provides further assessment on the cleanliness of shared toilets and factors influencing users' collective cleaning behaviour.

Target respondents and sampling procedure

This study only interviewed users of shared toilets in three slums that were part of the 50 slums of Kamala surveyed in 2010 that had most dirty toilets. All households that were using a shared toilet in the study areas were included in the sample. We define shared toilets as facilities used by more than one family, and users mostly geographically defined or known to each other (Mazeau et al., 2013). Users of private toilets (only one family using a toilet room) or public toilets (toilets open to all – with a caretaker or often users having to pay per visit) were excluded from this survey. Our target respondents were households individuals that shared a toilet room. In each household, only one person was interviewed, mainly the household head or spouse. An eligible participant was only interviewed upon giving consent. However, exceptions occurred during data collection where respondents other than household heads or spouses were interviewed. This only happened if it was not possible to have appointments with the target respondents during the study period. In this case, other household respondents aged 18 years and above interviewed if found at home. All in all, a total of 424 respondents using 41 toilet facilities were interviewed.

Data collection and analysis

Semi-structured questionnaires were used to collect data on the socio-demographic factors and collective cleaning behaviour of the shared toilet users. The questionnaires were administered through face-to-face interviews. Six research assistants were recruited and taken through a series of training prior to actual field work to provide support in data collection. The questionnaire was pretested and re-revised before actual data collection to ensure quality. The questionnaire items included respondents' socio-demographic factors, type of shared sanitation facility, behavioural psychological factors and social dilemma factors (See Annex 1).

Data collected was regularly checked by the field supervisor and the principal investigator to ensure quality and completeness of the questionnaires. Software Package for Social Sciences (SPSS) was used in the analysis of collected data. Frequencies, percentages, means and associations were generated at the various univariate, bivariate and linear regression analyses. All RANAS and social dilemma predictors significantly related to users of shared toilets cleaning behaviour at bivariate analysis were included in the linear regression model at multivariate analysis.

Ethical approval

This research was conducted with strict compliance with the ethical principles of the American Psychological Association and the Declaration of Helsinki. Ethical research approval for this part of research was obtained from the University of Zurich ethical review board, and Uganda National Council of Science and Technology. This research is part of the overall PhD studies on household demand and behaviour for improved sanitation in Kampala urban slum settlements.

Results

The socio-demographic characteristics of the respondents is shown in Annex 2. The majority of the respondents were female (75%). The mean age of the respondents was 31 years (Minimum 18 and maximum 75) and the majority interviewed were tenants (91.5%).

The mean number of people living in respondents' households was about 4 persons (3.55) per household (minimum 1 to maximum 30).

Cleanliness of shared toilets

Overall, over half of the shared toilets were reported clean (Table 1). However, interviewer observations showed that more shared toilets were very dirty than what was reported by the interviewees. Statistically significant Pearson correlation ($P<0.01$) between interviewee perceived cleanliness and observed cleanliness by interviewers.

Table 1: Perceived and observed cleanliness

Variables	**Frequency**		**Percentage**	
	Perceived	**Observed**	**Perceived**	**Observed**
Not dirty at all	271	225	63.9	53.8
A little bit dirty	44	41	10.4	9.8
Quite dirty	13	22	3.1	5.3
Dirty	65	59	15.3	14.1
Very dirty	31	71	7.3	17.0
Total	424	418	100.0	100.0

The reasons mentioned by respondents (n = 271) whose shared toilets were clean mainly related to the issue of cleaning them daily (62%) and cooperation (34.3%). The other reasons (accounting for 3.7%) were every user household having a cleaning day, easy to clean toilet, few users, good toilet floor and toilet lockable.

On the other hand, respondents (n = 153) whose toilets were dirty mainly attributed it to a big number of user families (40.9%) and lack of cooperation (30.2%). The other reasons included bad use by some tenants (9.4%), misuse by children (5.4%), toilet almost full (3.4%),

toilet full (2.7%), toilet having maggots (2%), not yet cleaned (2%) and misuse by outsiders (2%). Excreta on the walls and floor of the toilet room accounted for 2.1% of the respondents.

The cleaning of the shared toilets was largely gender-based. More than a third of the respondents (73.1%) reported that females were mainly responsible for the cleaning of shared toilets. About 15% of the respondents mentioned that males were mainly responsible for cleaning persons and 9.9% of the respondents reported that both males and females were responsible for cleaning. Only 2.1% of the respondents mentioned that nobody was responsible for cleaning in their households.

The four main features defining a clean toilet as perceived by respondents were absence of excreta in the toilet room (71.2%), no smell (64.2%), no flies (46%) and dry toilet floor (41.3%). More information is shown in Table 2.

Regarding cleaning frequency, 44.3% of the 424 respondents reported cleaning the shared toilet daily, 34.4% once or several times a week, 1.4% every second week, 5.4% once or several times a month, and 14.4% were not involved in cleaning at all. The respondents were using mostly brooms (71.9%) and a mixture of water with detergent (73.8) to clean the toilets (Table 2).

Table 2: respondents' understanding of a clean toilet and what is used in cleaning

Variables	Frequency (N=424, Multiple responses)	Percentages
Perceived understanding of a clean toilet		
No faeces	302	71.2
Toilet does not smell	272	64.2
Toilet room has no flies	195	46.0
Floor soaked with urine	175	41.3
Faeces on toilet walls	30	7.1
Toilet room has no maggots	27	6.4
Toilet hole cover lid available	20	4.7
Toilet ventilated	5	1.2
Cleaning items		
Water mixed with soap detergent	313	73.8
Broom	305	71.9
Plain water	65	15.3
Cleaning brush	46	10.8
Use a cleaning rag	5	1.2
Smoking it using papers	4	.9

The ventilated improved pit-latrines were the most dominant (74.8%), followed by simple pit-latrines (14.1%) and pour flush toilets (11.1%) .

A number of diseases were reportedly associated with a dirty shared toilet. Out of 424 respondents, the diseases most frequently (multiple responses) mentioned were diarrhoea (70%), cholera (58.7%), candida (41%) and dysentery (17.2%).

Factors influencing shared toilet users cleaning behaviour

To determine the factors influencing collective cleaning of shared toilets by users, we regressed respondents' self-reported cleaning frequency on the psychological (RANAS) and social dilemma factors.

RANAS and social dilemma factors

In the first step of the linear regression, RANAS factors were regressed on respondent's cleaning frequency. The RANAS variables accounted for 75.4% of the variation in respondents' cleaning behaviour (Table 3). The introduction of social dilemma factors in the regression model increased the variance explained by the model to about 77%, as indicated by the R square of 0.767. There was no collinearity in the regressed variables (VIF below 6). The factors that were not statistically significant to respondents' cleaning behaviour were excluded from the hierarchical linear regression. These include the affective factor to use a dirty toilet (RANAS), social identity factors of households relationships, behaviour of others factors of individuals' cleaning cooperation and individuals participating less in cleaning, and lastly, unintended non-cleaning cooperation factor of individuals who are not held responsibility for toilet dirt due to their inabilities (social dilemma).

Table 3: Linear hierarchical regression of respondent's cleaning on RANAS and social dilemma variables

		Unstandardized Coefficients		**Standardized Coefficients**		
Factor blocks	**Variables**	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
	Step 1					
	(Constant)	.390	.440		.886	.376
Risk factors	Vulnerability to get disease	.052	.080	.017	.656	.512
	Severity of disease	-.060	.084	-.019	-.710	.478
Attitude factors	Affective feeling - cleaning shared toilet	-.059	.015	-.126	-3.998	.000
	Instrumental - cleaning time consuming	.071	.047	.055	1.511	.132
	Instrumental - cleaning effortful	.039	.040	.035	.976	.329
Norm factors	Injunctive - approval to clean	.015	.020	.023	.740	.460
	Injunctive - social pressure to clean	.017	.026	.018	.657	.512
Ability factors	Self-efficacy - cleaning difficulty	-.006	.034	-.007	-.178	.859
	Self-efficacy - cleaning schedule	-.064	.029	-.063	-2.239	.026
Self-regulation factors	Action planning - cleaning daily routine	.505	.048	.521	10.538	.000

	Remembering to clean	.139	.049	.115	2.825	.005
	Cleaning commitment	.287	.052	.287	5.505	.000
	Step 2					
	(Constant)	.331	.451		.735	.463
Risk factors	Vulnerability to get disease	.031	.079	.010	.398	.691
	Severity of disease	.023	.084	.007	.269	.788
Attitude factors	Affective feeling - cleaning shared toilet	-.060	.015	-.129	-4.055	.000
	Instrumental - cleaning time consuming	.076	.047	.058	1.610	.108
	Instrumental - cleaning effortful	.048	.040	.043	1.205	.229
Norm factors	Injunctive - approval to clean	.012	.020	.017	.576	.565
	Injunctive - social pressure to clean	-.003	.026	-.004	-.133	.894
Ability factors	Self-efficacy - cleaning difficulty	-.026	.036	-.028	-.713	.476
	Self-efficacy - cleaning schedule	-.069	.029	-.068	-2.346	.019
Self-regulation factors	Action planning - cleaning daily routine	.405	.051	.419	7.937	.000
	Remembering to clean	.118	.049	.097	2.410	.016
	Cleaning commitment	.237	.053	.237	4.462	.000
Social motive factor	Respondents cleaning more than other users	.091	.021	.146	4.247	.000
Communication factors	Talking frequency	.007	.035	.005	.191	.849
	Talking ease	.030	.033	.032	.903	.367
Perceived efficacy factors	Shared toilet users' cleaning cooperation	.042	.036	.043	1.169	.243
	Cleanliness confidence if other users are cooperative in cleaning	-.085	.053	-.045	-1.601	.110
Group dynamics factor	Cleaning team	.057	.038	.063	1.508	.132

Step 1: Regression of cleaning behaviour on RANAS variables, N = 417, R Square = .754. Step 2: Regression of cleaning behaviour on RANAS and Social dilemma variables, N = 415, R Square = .767

The negative statistically significant attitudinal affective factor associated with respondents' cleaning of the shared toilet means that the less respondents like to clean a shared toilet, the less their cleaning behaviour. The negative statistically significant ability factor of cleaning schedule means that respondents cleaning behaviour is less if their households have no cleaning roster regarding when to clean the shared toilet. On the other hand, the statistically significant self-regulation factors mean that respondents are more likely to frequently clean

shared toilets if cleaning is part of their daily routine activities, easier to remember when to clean, and, cleaning commitment. Only one of the social dilemma variables was statistically significant. Respondents who believed were cleaning more than the other shared toilet users participated more in collective cleaning as shown by the social motive factor.

Respondents' cleaning commitment

As shown in Table 4, social dilemma factors accounted for 67% (R Square = .669) of the variation in respondents' collective cleaning commitment of the shared toilets.

Table 4: Linear regression of respondents cleaning commitment on social dilemma factors

		Unstandardized Coefficients		**Standardized Coefficients**	
Variables		**B**	**Std. Error**	**Beta**	**Sig.**
	(Constant)	.726	.259		.005
Social motives	Cleaning toilet more than other users	.166	.016	.338	.000
Social identity	Shared toilet users' relations	.086	.020	.219	.000
Behaviour of others	Cleaning households	.003	.001	.072	.018
	Individual's cooperation in cleaning	.018	.039	.013	.653
	Respondents cleaning less than other users	-.083	.018	-.162	.000
Communication	Talking frequency with other users	.081	.031	.080	.008
	Ease to talk to other users	.154	.028	.212	.000
Unintended non-cooperation	Individuals not held responsible	.049	.043	.032	.258
Perceived efficacy	Shared toilet users' cleaning cooperation	.036	.033	.048	.277
	Cleanliness confidence if other users are cooperative in cleaning	.136	.046	.092	.003
Group dynamics	Cleaning team	.084	.033	.118	.012

N = 422, R Square = . 699

Social dilemma factors such as social motives, social identity, communication and group dynamics were positively related to respondents' commitment to clean their shared toilets. Commitment was greater among respondents who believed to clean more than the other

users of the shared toilets, respondents who positively related with other users, respondents who easily talked with other users and respondents who felt as being a team with the other users. However, while the perceived efficacy factor of households' cooperation to clean shared toilets was not statistically significant, commitment was likely among respondents who had confidence that cleanliness of the shared toilets depends on the cooperation of all user households. Lastly, the behaviour of other households' cooperation in cleaning of the shared toilets was also not statistically significant. However, cleaning commitment by shared toilet users was less among respondents who reported cleaning less than the other toilet users.

Discussion

The aim of this study was to investigate the cleanliness of household shared toilets in three urban slums in Kampala and the factors influencing users' cleaning behaviour.

Cleanliness of shared toilets

Overall, the level of cleanliness of household shared toilets in the three studied slums of Kampala was above fifty percent. Six of every 10 household respondents reported that their shared toilets were clean. This is moderately consistent with interviewer observations that showed five of every 10 respondents having clean shared toilets. The respondents mainly define a shared toilet as clean if the toilet room has no excreta on the floor, does not smell, has no flies and has a dry floor – not flooded with urine. As reflected in the findings from a study on determinants of households' cleaning intention for shared toilets (Tumwebaze et al., 2014), respondents' perceived toilet cleanliness is reported more than is observed by interviewers. The lack of cleanliness of shared toilets is one of the key reasons why shared toilets are considered as unimproved by the United Nations Joint Monitoring Program for water and sanitation (UN-JMP) (WHO/UNICEF, 2012). Indeed, a number of studies have reported on the unclean situation of shared sanitation facilities in most urban informal settlements (Buttenheim, 2008, Rahman et al., 2010, Tumwebaze et al., 2014).

Cleanliness of the shared toilets was largely dependent on users' cleaning frequency and cooperation. Six out of every 10 household respondents reported cleaning their shared toilets on a daily basis. Cleaning cooperation among user households was reported in three of every 10 household respondents. On the other hand, dirty toilets were mainly attributed to the big number of users (four of every 10 household respondents) and lack of cleaning cooperation (three of every 10 household respondents). These findings suggest that regular cleaning and cooperation among user households is important to achieve hygienic maintenance of shared toilets. In line with other studies, this study found that shared toilets were more likely to be dirty if they were being used by a big number of households (Karn et al., 2003, Gulyani and Talukdar, 2008). One of the reasons why many users of a shared toilet could lead to deterioration in its cleanliness is the diffusion of cleaning responsibilities and lack of cooperation (Isunju et al., 2011).

Furthermore, this study found that the cleaning of the shared toilets was gender based, with females being 6 times more involved in cleaning than males. This is not surprising, since women are more involved in preventive health undertakings in regard to domestic hygiene (Graf et al., 2008, Joshi et al., 2011, Tilley et al., 2013). The main materials reportedly used in cleaning toilets in this study were brooms and water mixed with detergent. Most of the shared toilets were ventilated.

Factors influencing respondents' cleaning of shared toilets

The determinants that significantly relate to the cleaning behaviour of shared toilet users is explained by RANAS and social dilemma factors.

RANAS and social dilemma influence on cleaning behaviour

The RANAS model of behaviour change approach is key in understanding the cleaning behaviour of shared toilet users. This study shows that most variations in respondents' cleaning

behaviour for shared toilets can be explained by the RANAS model than the social dilemma. The most important of the RANAS and social dilemma factors, with high beta values are the self-regulation factors and the social motive factor respectively (Table 3).

Self-regulation factors such as action planning, remembering, and commitment significantly relate to respondents' cleaning behaviour for their shared toilets. Firstly, action planning is a key factor in cleaning of shared toilets by users. The respondents were more likely to report frequent participation in cleaning their shared toilet if ensuring cleanliness of shared toilet was one of their routine activities. This finding is in agreement with studies that report on the importance of action planning in sustained behaviour performance (Gollwitzer et al., 2005, Schwarzer, 2008). The implication of this study finding is that action planning, as reflected in shared toilet users' integration of cleaning as part of their routine activities, fosters control and continued performance of the cleaning behaviour (Schüz et al., 2007).

The second self-regulation factor influencing cleaning behaviour of shared toilet users is commitment. The more respondents were committed to cleaning their shared toilet, the more they participated in the cleaning of the shared toilets. This study finding implies that people are more likely to perform a behaviour if they are committed to its performance. Bandura contends in his studies that the higher the goals people set for themselves and their perceived efficacy, the more likely their commitment to achieve the desired behaviour (Bandura, 1991, Bandura, 2004).

The third self-regulation factor influencing cleaning behaviour related to remembering when to clean perform the cleaning. The respondents who found it easy to remember when to clean were more likely to participate in cleaning than those who found it almost impossible to remember. Mosler (2012), maintains that performance of desired behaviour needs to be supported with prompts set by an individual to act as triggers or reminders to help remember the behaviour. The implication of the study finding is that behaviour is performed more if it is easy to remember when it needs to be performed (Tobias, 2009).

The other RANAS factor significantly associated with respondents' cleaning behaviour is the affective factor. Respondents were less likely to clean a shared toilet if they disliked it. If a behaviour is associated with emotional displeasure, the chances are low that it will be performed (Trafimow and Sheeran, 1998, Giner-Sorolla, 2001). On the other hand, positive affect is reported to have a high likelihood for one to perform or adopt a health behaviour (Kraemer and Mosler, 2010). Thus, in settings such as the slums where facilities are shared and users are responsible for their maintenance, it is important that persuasive approaches that encourage cleaning behaviour performance are promoted, such as stressing health attributes from using a clean toilet (Crano and Prislin, 2006).

Lastly, as shown in Table 3, respondents' social motives had a significant influence on their cleaning behaviour. This study found that respondents' cleaning was common among those who believed were cleaning the shared toilet more than other user households. According to Maccrimmon and Messick (1976), social motive factors are manifested when one takes the outcomes of others into account when making choices. Cleaning of shared toilets in this study was mainly reported among respondents who perceived their cleaning to be more or the same as others who were participating in cleaning. The implication from this finding is that promotion of cleaning as a social motive factor is important among users of shared toilets to maintain them clean, for example among respondents who may have toilet-going children.

Influence of social dilemma factors on cleaning commitment

In this study, as shown in Table 4, social dilemma factors show a great influence on respondents' cleaning commitment for their shared toilets.

Firstly, the social motive factor had the biggest influence on respondents' commitment to participate in the cleaning of shared toilets. This study found that respondents who believed they were cleaning the shared toilet more than the other users had more commitment than those who believed they cleaned less than the other users. A user of a shared toilet may involve more

in its cleaning if he or she values using clean facilities or is aware of risks associated with having to use a dirty toilet. This finding implies that promotion of values that are beneficial to all people within a given group or setting reinforces social values which in turn may foster individual commitments in performing desired behaviours (Kramer et al., 1986).

Secondly, respondents having a good relationship with other toilet sharing households were more likely to be committed to cleaning the shared toilet than those who viewed their relationship with other users as bad. Having a good relationship with other users promotes a feeling of togetherness and belonging which is the foundation for social identity (Blake and Fred, 1989). This is probably why group dynamics is significantly associated with respondents' commitment to participate in cleaning shared toilets. The promotion of social identity among individuals with different ethnicities may be improved by encouraging communication among users of the shared toilets. This is further seen in this study where communication is also positively related to shared toilet users' cleaning commitment. The less difficult users of shared toilets find it to talk to each other and the more often they talk to each other, the more likely is their commitment to clean the shared toilets. These findings are comparable to other studies that have reported on the importance of communication in fostering cooperation or promotion of health behaviours (Curtis and Cairncross, 2003, Balliet, 2010).

Lastly, respondents' commitment to clean shared toilets related to their perceived self-efficacy. The more confident a shared toilet user is of the cooperation of others in cleaning, the more likely is the individual's cleaning commitment. This finding shows that the behaviour of others can have an influence on individuals' cleaning commitment, as seen in the case for individuals who reported cleaning less than the other users of the shared toilet.

Limitations and proposed future studies

This study focused on users of shared toilets in urban slums. While shared toilets vary pending on the providers, access to them or their management, we limit our scope to only facilities

where use is restricted to certain groups of people or households and who are also responsible for their cleaning.

Secondly, interpretation and generalizability of the findings to other slum settings should be done with caution. This is because more studies are needed to validate our findings and theories. While the RANAS model has been widely used in most water related and hand washing studies, none of the previous studies focused on the behaviour such as cleaning behaviour of the shared toilet users. This limitation also applies to the social dilemma or other studies on water and sanitation. Thus this being a new approach to study cleaning behaviour of shared toilet users, it would benefit from more validation studies.

The above factor also provided limited scope through which the findings in this study could be compared with other findings conducted in different slum settings of other countries.

Nevertheless, findings from this study provide a baseline foundation through which more extensive research can be conducted in the areas of shared toilet users' maintenance using the RANAS model of behaviour change techniques and items from social dilemma theory.

Conclusion

This study has showed that RANAS and social dilemma factors are important in assessment of health behaviours, such as cleaning behaviour among users of shared toilets in urban slums. While the RANAS factors provide a greater explanation of the factors influencing the users of shared toilets' collective cleaning behaviour than the social dilemma factors, the social dilemma factors equally important influencing predictors for shared toilet users' cleaning commitment. Very important were self-regulation factors, affective beliefs and social motives as important predictors for the cleaning behaviour, and social dilemma factors such as social motives, social identity and communication as important predictors for respondents' cleaning commitment.

Annex 1: Question items

Questionnaire variables

a) Situational variables

Situational factors	**Measurement**
Sex	□□Respondent sex [1= Male, 2= Female]
Age	□□Age in complete years [Numeric]
Household ownership	□□Do you own or rent the household you live? [1= Own, 2= Rent]
Years in household	□□How long have you been living in this house? [1= < 1 year, 2= 1 to 2 years, 3= 3 years plus]
Change of location plans	□□Do you plan to move and live in another area within a year's time from now? [1= I don't know, 2 = No, 3= Yes]
Religion	□□What is your religion [1= Catholic, 2= Protestant, 3= Muslim, 4= Others (Born again, Seventh Day Adventist)]
Education level	□□What is your highest level of formal education? [1= None, 2= Primary, 3= Secondary, 4= Tertiary]
Occupation	□□What kind of job are you employed? [1= Not employed, 2= Civil / formal employment, 3= Casual labourer, 4= Business]
Estimated monthly income	□□If employed or have some kind of work, what is your estimated monthly income? [1= < 50,000, 2= 51,000 to 100,000, 3= 101,000 to 150,000, 4= 151,000 to 200,000, 5= > 200,000, 88= do not know or no response]
Household population	□□How many people live in your household? [Numeric]
Children in household	□□How many children below 5 years are in your household? [Numeric]
Sanitation facility	□□What type of toilet does your household use? [1= Flush toilet, 2= Pour flush, 3= Ventilated Improved Pitlatrine, 4= Ecosan toilet, 5= Simple Pitlatrine]
Cleanliness	□□How satisfied are you with the current cleanliness of your shared toilet?

satisfaction

b) RANAS variables

Psychological (RANAS) factors	
Factor blocks	**Measurement**
Risk beliefs	
Vulnerability	□□What are the chances that you get sick if you used a dirty toilet? [1= Impossible to 5= very possible]
Severity	□□Imagine you contracted a disease like cholera, how severe would it be on your social life, household and economic situation? [1= Not severe at all to 5= very severe]
Factual knowledge	□□What diseases is one likely to contract as a result of using a dirty toilet? [Open ended]
Attitudinal beliefs	
Instrumental	□□How time consuming is it for you to clean a shared toilet? [1= Very time-consuming to 5= not at all time-consuming] □□How effortful is it for you to clean your shared toilet? [1= Very effortful to 5= not at all effortful]
Affective	□□How do (would) you feel to clean a toilet shared with other households? [1= I dislike it very much to 9= I like it very much] □□How negative do you think it is to use a dirty toilet? [1= Not at all negative to 5= very negative]
Normative beliefs	
Injunctive norms	□□In general, do you think most people important to you rather approve or

	disapprove that you clean the toilet shared with other households? [1= Very strongly disapprove to 9= very strong approval] □□Do you feel a form of social pressure to clean your shared toilet? [1= Not at all to 5= very much]
Ability beliefs	
Self-efficacy	□□How difficult is it for you to clean a toilet shared with other households? [1= Very difficult to 5= not difficult at all] □□Do you or your household have any detailed schedule or roster regarding when to clean the shared toilet? [1= Not at all to 5= very much detailed schedule]
Self-regulation beliefs	
Action planning	□□Is ensuring cleanliness of the shared toilet on the daily routine of your activities? [1= Not at all to 5= very much part of daily activities]
Remembering	□□How difficult is it to remember to clean your shared toilet? [1= Very difficult to 5= not difficult at all]
Commitment	□□Do you feel committed to cleaning your shared toilet? [1= Not at all committed to 5= very committed]
Behavioural factors	
Shared toilet cleanliness	□□How dirty is the toilet you share with other households? [1= Very dirty to 5= not dirty at all]
Cleaning frequency	□□How often do you clean your shared toilet? [1= Never to 5= every day or more often]

c) Social dilemma variables

Social dilemma factors	
Factor blocks	**Measurement**
Social motives	
Perceived cleaning frequency	□□Do you clean the shared toilet more or less often than the other users? [1= Much less to 9= much more]
Social identity	
Households relationship	□□How good or bad is your relationship with the other households you share with a toilet, in terms of its cleaning? [1= Very bad to 9= very good]
Behaviour of others	
Cleaning households	□□How many of the toilet room sharing households participate in its cleaning? [1= (Almost) nobody (0%) to 5= (Almost) all of them (100%)]
Individual's cooperation	□□How much do you think that keeping the shared toilet clean depends on your cooperation with other user households? [1= Not at all much to 5= very much]
Individual's cleaning	□□I do not clean the shared toilet more because other users do not do the same. How much do you agree with this statement? [1= I strongly agree to 9= I very strongly disagree]
Communication	
Talking frequency	□□How often do you talk with other toilet sharing households on the way it is used or managed? [1= (Almost) never to 5= (Almost) always]
Talking difficult	□□How difficult is it to talk to other families who you share with a toilet not dirt it? [1= Very difficult to 5= not difficult at all]
Noise	

Cleaning exemption	How much of the shared toilet dirt would you think is due to persons that just could not clean up or cannot be made responsible (e.g. children, elderly, sick)? [1= None (0%) to 5= (Almost) all (100%)]
Perceived efficacy	
Households cooperation	How confident are you that households you share a toilet with cooperate in its cleaning? [1= Not confident to 5= very confident]
	How confident are you that your shared toilet can be kept clean if all households are cooperative? [1= Not confident to 5= very confident]
Group dynamics	
Cleaning team	How much do you feel as a team with other households you share a toilet in regard to its cleaning? [1= Not at all much to 5= very much]

Annex 2: Socio-demographic characteristics

Variables	Frequency (N = 424)	Percentage
Sex		
Male	106	25.0
Female	318	75.0
Rental status		
Own	36	8.5
Rent	388	91.5
Years in household		
< 1 year	97	22.9
1 to 2 years	115	27.1
3 years and above	212	50.0
Change of location plans		
No	302	71.2
Yes	53	12.5

I don't know	69	16.3
Religion		
Catholic	137	32.3
Protestant	97	22.9
Muslim	160	37.7
Other	30	7.1
Education		
None	32	7.5
Primary	162	38.2
Secondary	194	45.8
Tertiary	36	8.5
Employment		
None	137	32.3
Formal employment	22	5.2
Informal employment (mostly on day-to-day basis)	158	37.3
Business	107	25.2
Estimated monthly income (N = 287)		
< 50,000	85	29.6
51,000 to 100,000	79	27.5
101,000 to 150,000	27	9.4
151,000 to 200,000	25	8.7
> 200,000	44	15.3
Don't know / no response	27	9.4
Type of household sanitation facility		
Pour flush	47	11.1
Ventilated Improved Pit latrine (VIP)	317	74.8
Simple pit latrine	60	14.2

Study 4: Effectiveness of group discussions in increasing cleaning behaviour of shared sanitation users in Kampala slums, Uganda and effects on behavioural determinants

Abstract

Access to shared sanitation facilities in urban slums has been increasing in most Sub-Saharan African and Southern Asian countries. However, to ensure hygienic use and to reduce the high risk of exposure from a range of preventable diseases, such as diarrhoea and respiratory and intestinal infections, that are associated with the use of dirty toilets, users' regular cleaning of the facilities is fundamental. This study evaluated the effectiveness of theory and evidence-based interventions (group discussions and group discussions plus commitment) on shared sanitation users' cleaning behaviour and their psychosocial determinants in three slums in Kampala city, Uganda. It was conducted following the Risk, Attitudes, Norms, Abilities and Self-regulation (RANAS) model of behaviour change and social dilemma theory concepts. The interventions were developed following pre-intervention survey findings that showed that shared sanitation cleanliness was associated with users' cleaning frequency, cleaning obligation, commitment, sanitation cleaning difficulty, confidence of other users' cooperation, cleaning affect and communication among the users. Compared to the controls, the intervention greatly increases cleaning behaviour. The interventions led to improvements in the psychosocial behavioural determinants, such as cleaning obligation, cleaning ease, cleaning approval and cleaning affective belief which in turn increased cleaning behaviour. Furthermore, the intervention led to improvements in the commitment of the participants and an increase in their confidence that others would cooperate in cleaning. In conclusion, this study shows that group discussions, more especially when supplemented with a commitment is an effective approach to increase shared sanitation users' cleaning behaviour.

Key words: cleaning behaviour, group discussions, RANAS, shared sanitation, slums, Uganda

Introduction [4]

Shared sanitation facilities are a common good to over 761 million people in many developing countries' urban slums, especially in Eastern Asia, Sub-Saharan Africa and Southern Asia (WHO/UNICEF, 2013, WHO/UNICEF, 2014). However, evidence from several studies shows that most shared sanitation facilities are often dirty and not safe to use (Tumwebaze, 2014, Tumwine et al., 2003, Bartlett, 2003, Rheinländer et al., 2010). For this reason, they are associated with a wide range of diseases such as diarrhoea (Heijnen et al., 2014, WHO/UNICEF, 2012, Sijbesma, 2008). Increasing cleaning behaviour among the users of the facilities could possibly enhance the health and non-health benefits associated with access to hygienic facilities (Jenkins and Curtis, 2005, Diallo et al., 2007, Rodgers et al., 2007). Some of the reasons reported for irregular cleaning of shared sanitation facilities in urban slums are associated with users' lack of cleaning cooperation, large user families, irresponsible use, heterogeneity of the users and the effort required to keep them clean (Tumwebaze et al., 2014, Isunju et al., 2011, Tumwebaze et al., 2012, Wegelin-Schuringa and Kodo, 1997).

While regular cleaning of shared sanitation facilities is important, to our knowledge, we found no studies done about interventions that promote cleaning behaviour among the users of shared sanitation facilities. According to findings from a cross-sectional study on habitual cleaning behaviour and latrine cleanliness conducted in rural Burundi, the authors recommend interventions that focus on promoting cleaning behaviour target factors, such as commitment, self-efficacy and satisfaction with a clean latrine (Sonego and Mosler, 2014). Similarly, several studies emphasize the importance of theory in behaviour change promotion (Michie et al., 2008, Hardeman et al., 2002, Fishbein and Ajzen, 2010, Schwarzer, 2008, Aboud and Singla, 2012). Theory-based interventions are reported to be more effective at changing behaviour since theoretically derived determinants inform which behaviour techniques would be applicable to

[4] This study is submitted: Tumwebaze, I. K., and Mosler, H.-J. (submitted). Effects of group discussions in increasing cleaning behaviour of shared sanitation users in Kampala slums, Uganda, and effects on behavioural determinants . *Social Science and Medicine*

change targeted behaviours (Mosler, 2012, Michie and Abraham, 2004, Michie and Johnston, 2012). Aboud and Singla (2012) highlight theories of behaviour change, evidence of success and failure of past intervention attempts, and an in-depth understanding of one's audience as key to behaviour change interventions.

Our study is based on the RANAS model of behaviour change techniques (Mosler, 2012) and social dilemma theory concepts – mainly factors that influence cooperation and collective action (Tumwebaze and Mosler, 2014b, Balliet, 2010, Olson, 1965, Ostrom, 2000). Using these sources, a pre-intervention survey was conducted to identify the possible influencers of shared toilet users' cleaning behaviour in three slums in Kampala and develop appropriate interventions: group discussions and discussions plus commitment, targeting the increase of the cleaning behaviour of users of dirty facilities.

The findings of the pre-intervention survey showed that self-regulation factors (cleaning obligation, cleaning being part of daily routine activities, cleaning commitment and remembering when to clean), ability factors (user families having a cleaning roster), attitude factors (cleaning affect) and social motives (an individual cleaning more than other facility users) were the RANAS and social dilemma determinants associated with users' cleaning of shared sanitation facilities. RANAS is structured into five comprehensive factor blocks, derived from social-cognitive health theories, for instance, Theory of Planned Behaviour (TPB) (Ajzen, 1991) and the Health Action Process Approach (HAPA) (Schwarzer, 2008). The RANAS factor blocks are Risk Factors – which relate to individual's understanding and awareness of health risks; Attitude Factors – that relate to having a positive or negative stance towards performing a behaviour; Norm Factors – concerning convictions about performing a behaviour and what the social network thinks about it; Ability Factors – about the aptitudes and individual beliefs necessary to have to perform a behaviour; and Self-regulation Factors – which relate to the continuation and maintenance of a behaviour (Mosler, 2012). From social dilemma theory (Dawes, 1980), the following factors have been reported in different studies as influencing

collective behaviour: group size effect, group dynamics, social motives, social identity, behaviour of others and communication reported in different studies to influence collective behaviour (Bonacich et al., 1976, Weber et al., 2004, Liebrand, 1984, Van Zomeren et al., 2008). Social dilemma research is particularly important in stressing out the importance of communication in promoting cooperation and collective action (Balliet, 2010). A study on shared toilet users collective cleaning behaviour found that social dilemma factors, such as social motives (an individual cleaning more than other facility users), social identity (relations among facility users), behaviour of other users (participation in cleaning), communication (frequency of communication among facility users and ease to talk with each other) and perceived efficacy (confidence in the cooperation of user families in cleaning) were associated with shared sanitation users' cleaning commitment (Tumwebaze and Mosler, 2014a).

In the current study, cleaning interventions were based on theory and evidence-based findings from the pre-intervention survey (Tumwebaze and Mosler, 2014a). Group discussions were primarily undertaken as a persuasive behaviour change technique. While communication has been reported to be effective in fostering group identity and commitment in social dilemmas (Kerr and Kaufman-Gilliland, 1994), its application in this study was to test its effectiveness in increasing shared toilet users' cleaning behaviour. Face-to-face communication is reported to be more effective at strengthening cooperation than any other form, depending on the content of the messages contained in the communication and the issues (Balliet, 2010, Frohlich and Oppenheimer, 1998, Thompson and Stoutemyer, 1991). The importance of communication in the promotion of health behaviour is also emphasized in different studies (Curtis et al., 2001, Pinfold, 1999, Bajracharya, 2003). Various theory and evidence-based studies suggest adding commitment to group discussions as this has demonstrated effectiveness at fostering the adoption of targeted health behaviours (Inauen et al., 2013, Lokhorst et al., 2013).

The main research questions in this study were: 1) Do group discussions change shared sanitation users' cleaning behaviour and psychosocial behavioural determinants?; 2) Does

adding a commitment after the discussion have additional effects on changing cleaning behaviour and psychosocial behavioural determinants?; 3) How do group discussions work in regard to psychosocial behavioural determinants?; and 4) Does adding a commitment after the discussion make them work differently?

Methods

A longitudinal study was conducted in the slums of Kampala between October 2010 to September 2013. While the objective of the 2010 survey was to establish the sanitation situation in Kampala's slums and users' satisfaction with the sanitation facilities (Tumwebaze et al., 2012), the current study focusses on the effect of cleaning interventions in three slums that had the least clean toilets in the 2010 survey. Sanitation facilities and latrines are used interchangeably in this paper. Secondly, cleaning behaviour in this study refers to the cleaning of the shared sanitation facility – measured by self-reported cleaning frequency. A shared toilet (room) in this paper refers to a facility jointly used by different families, mostly known to each other or sharing a compound house (Tumwebaze et al., 2012, Mazeau et al., 2013). The management of the facilities, such as their cleaning is mainly done by the user families. These facilities are of varying technologies, such as flushing or pour flush toilets, ventilated improved pit latrines (VIP) – mostly lined pits and a superstructure with a vent pipe for ventilation, and simple unlined pit latrines.

Study Background

In 2010, a sanitation survey was conducted in fifty randomly selected slums from the five divisions of Kampala City Capital Authority (KCCA). A total of 1,500 household respondents, selected through random route sampling were interviewed. The main finding from this survey was that the majority of respondents reported having access to sanitation facilities, though most of them were shared and dirty (Tumwebaze et al., 2014). Between December 2012 and January

2013, a pre-intervention survey to assess the cleanliness of shared sanitation facilities and users' cleaning behaviour was conducted in three of the 50 surveyed slums in 2010 that had the least self-reported clean toilets. A total of 424 household users of shared toilets were interviewed. The users of private or public sanitation facilities were excluded. The findings of the pre-intervention survey coincided with those of 2010, that a number of shared latrines were dirty. About 4 of every 10 household respondents reported that their shared latrine was dirty(Tumwebaze and Mosler, 2014a). Shared latrine were considered dirty if the room was found having excreta around the room or squat hole, slab soaked with urine, presence of flies, and strong smell. It was also established from the pre-intervention survey that a number of respondents were not participating in cleaning their shared latrines. Consequently, from the pre-intervention survey findings, interventions (group discussions) – aimed at increasing shared toilet users' participation in cleaning were developed and tested.

A follow-up survey was conducted between August and September 2013 – about 3 months after the intervention, to assess the effect of the discussions on shared sanitation users' cleaning behaviour. While the study targeted 424 household respondents who were interviewed in the pre- intervention survey, 305 were available at follow-up. Of the 305 interviewed respondents , only data from 119 respondents that belonged to the intervention conditions is presented. The interventions only targeted respondents that had dirty toilets from the pre-intervention survey. The majority of the respondents not contacted at follow-up had shifted to new locations. Sixteen belonged to group discussions and group discussions plus commitment respectively while 10 belonged to the control. The questionnaire items used to capture data on shared sanitation users' cleaning behaviour and psychosocial behavioural determinants are shown in Table 1.

Data analysis

Statistical data analysis was conducted using SPSS (version 17). The descriptive statistics on self-reported cleaning behaviour and psychosocial behavioural determinants are presented by the change in means from time 1 (pre-intervention survey) to time 2 (follow-up survey). General linear models (GLM) for repeated measures are used to show whether the change in means is different over group and time for research questions 1 and 2, and Mediation analysis (Preacher and Hayes, 2004) is used for questions 3 and 4 to show how group discussions worked in regard to behavioural determinants and if they worked differently with the addition of a commitment. Bootstrapping, as discussed by Preacher and Hayes (2008), is used to calculate confidence intervals of the indirect effects of group discussions on self-reported cleaning behaviour through the mediating behavioural determinants. By bootstrapping, 95% bias-corrected bootstrap confidence intervals for all indirect effects are generated using z = 1000 bootstrap samples (Preacher and Hayes, 2008). In this analysis, z = 5000 bootstrap samples were used.

Interventions and implementation procedure

From the pre-intervention survey, all respondents who had dirty latrines shared by four or more households were clustered into groups based on the shared facility. A total of 30 groups were formed in the three study zones; 14 in Kironde, 12 in Bakery and 4 in Lufula. Through randomisation, the 30 groups were allocated to control, group discussions and group discussions plus commitment blocks. At the end, there were 10 control groups that had no discussions, 10 groups with discussions only and 10 groups with discussions plus commitment. Shared sanitation user households that belonged to particular discussion groups were mobilized to talk with each other about how their sanitation facilities were being used and how best to cooperate in their cleaning. These discussions were moderated by a member from the community – mainly a local leader or village health worker from the respective zone. Each of

the intervention groups had one discussion meeting. The arrangement of the meetings and mobilizations were done by the local non-governmental organisation (NGO) called Sustainable Sanitation and Water Renewal Systems (SSWARS) through liaison with the local leaders and village health workers. SSWARS works in some slums in Kampala, but they were not working in the slums that were studied.

Ethical approval

Ethical approval was obtained from the University of Zurich (UZH) Ethical Review Board, and Uganda National Council of Science and Technology (Ref: SS 2800). This research is part of the overall PhD study on household demand and behaviour for improved sanitation in Kampala urban slum settlements. Mainly household heads or spouses were interviewed for this study upon providing written informed consent.

Results

Out of 119 respondents in the study groups, the majority were female (77.3%). The mean age of the respondents was 34 years (minimum 18, maximum 75). The majority of the respondents were tenants (90.8%), and more than two thirds (74.6%) had been living in the same household for three years or more. Of the other tenants, 23.8% had spent one to two years in the same household and 1.8% less than a year. The average number of persons living in each household was about four (M = 3.89) and 45.4% of the households had children below five years of age. Most of the shared sanitation facilities were ventilated improved pit latrines (VIP) (77.3%), followed by simple pit latrines (21.8%) and flush toilets (0.8%).

In regard to research question 1on whether group discussions change shared toilet users' cleaning behaviour and psychosocial behavioural determinants, the results showed that;

Compared to the control condition (no discussion), as shown in Table 2, self-reported cleaning behaviour increased in both discussions only and discussions plus commitment

conditions respectively. The mean change in the self-reported cleaning behaviour by shared toilet users was 2.78 times more in discussions and 3.33 times more in discussions plus commitment.

Furthermore, the discussion only condition shows statistically significant change in means in psychosocial behavioural determinants over group and time compared to the control condition. Specifically, determinants with significant change in means include disease severity, cleaning approval , cleaning cooperation confidence and cleaning habit. The addition of a commitment to the discussion condition showed statistical significance in additional determinants, such as cleaning affect, cleaning ease, cleaning obligation, cleaning routine and commitment.

In regard to research question 2 on whether adding a commitment after the discussion has additional effects on changing cleaning behaviour and psychosocial behavioural determinants, the results in Table 3 showed that there is added effect of discussions plus commitment condition over discussions only condition. In all variables, the mean change is statistically significantly increasing over time, except for severity and vulnerability. The discussions plus commitment condition also shows a statistically significant increase in the mean change for the cleaning commitment variable over group and time and is nearly two times more compared to the discussions only condition. There is also a difference in the mean increase in obligation and cleaning routine, but this is only a statistical tendency.

In regard to research questions 3 and 4 on how group discussions work with regard to psychosocial behavioural determinants, and whether adding a commitment after the discussion enhances self-reported cleaning behaviour, the results are shown in Table 4. Table 4 summarizes the mediation effects of group discussions on the self-reported cleaning behaviour for shared sanitation facilities. If a variable is significant, it means that the intervention (group discussions or group discussions plus commitment) is influencing the mediating psychosocial determinant which in turn creates change in the cleaning behaviour.

For the discussions only condition, the effect of discussions on self-reported cleaning behaviour is working through cleaning approval. The intervention increased shared sanitation users' injunctive norm that people important to them approve of their participation in cleaning , leading to positive effect on the behaviour. However, group discussions plus commitment condition shows even more effect. The discussions plus commitment intervention is working through cleaning affect, cleaning ease and obligation psychosocial determinants. Firstly, the effect of discussions plus commitment, working through obligation means that the intervention increased shared sanitation users' personal norm , leading to positive effect on the cleaning behaviour. Secondly, it worked through cleaning ease – meaning that the intervention increased shared sanitation users' perceived cleaning ease for the facilities, leading to the positive effect on the behaviour. Thirdly, it worked through cleaning affect – meaning that the intervention decreased shared sanitation users' perceived dislike for cleaning shared sanitation facilities, leading to the positive effect on the behaviour.

Discussion

Overall, findings from this study show that group discussions, and even more when supplemented with a commitment are effective interventions for improving the cleaning behaviour of shared sanitation users as well as strengthening the predicting determinants for the positive behaviour.

Influence of group discussions and discussions plus commitment on shared toilet users' cleaning behaviour and psychosocial determinants

In regard to research question 1, group discussions were effective at increasing users of shared sanitation facilities' cleaning behaviour. The increase in cleaning behaviour was shown by the significant change in the mean differences over time and group (Table 2). Firstly, the increase in self-reported cleaning behaviour is about three times more in group discussions than in the control conditions. It is likely that through discussions, people realized the need for

cleaning cooperation. Evidence from a number of studies shows that communication, especially when channelled appropriately, has positive influence on hygiene promotion and behaviour change (Curtis et al., 1997, Pinfold, 1999, Bajracharya, 2003, Curtis and Cairncross, 2003). Curtis and colleagues (1997), for example, found out that hygiene promotion in Bobo-Dioulasso, Burkina Faso could best be achieved by word of mouth as the most important information source for women.

Secondly, this study shows that group discussions lead to positive improvements in psychosocial behavioural determinants over time. As seen in Table 2, discussions greatly improved the confidence shared sanitation users have in the cleaning cooperation of other families using the facilities and the perceived users' cleaning approval. It is likely that since discussions involved families talking to each other about the way they use the shared facility, and challenges and possible solutions to keep it clean, it could have boosted their confidence of each families' participation in cleaning. The positive change in cleaning approval on the other hand means that discussions lead to an increase in the perceived belief among shared sanitation users that others approve of their participation in cleaning the facilities. The other determinants that showed a positive effect due to group discussions were perceived severity, habit and cleaning ease. On one hand, the positive change in cleaning habit and cleaning ease over time and group means that group discussions strengthens their influence on shared sanitation users' cleaning behaviour. While past research has shown cleaning difficulty and lack of cleaning materials or detergents as some of the reasons for the dirty state of shared toilets (Tumwebaze, 2014), it is probable that through discussions users of the facilities could have come up with solutions such as cooperation in cleaning or contributing to buying cleaning materials to make cleaning easier for each other. Some researchers contend that identifying barriers and planning solutions to alter behaviour change obstacles leads to the improvement in the performance of the desired behaviour performance (Michie et al., 2008, Schwarzer, 2008). On the other hand, the positive change in perceived severity means that group discussions strengthened its

influence on shared toilet users' cleaning behaviour. As shown in Table 2, there was no decrease or increase in perceived severity means in time one and two in the discussion condition while there was a decrease in the control condition. This that group discussions boosted the already high perceived belief among users of shared toilets that using them dirty leads to severe consequences in case of a disease outbreak.

Furthermore, the findings in this study show that the addition of a commitment over discussions only condition is reflected in its positive effect on the psychosocial commitment determinant. As shown in Table 3, commitment is the most improved predictor over time and group. The nearly doubled increase in cleaning commitment reinforces its value on group discussions' effect on the determinant. This findings coincides with a statement by Lokhorst et. al (2012) that when people make a commitment to a certain behaviour, they adhere to their commitment which, in turn, produces long-term behaviour change. The findings suggest the need for the integration of some forms of commitment in behaviour change programs to increase the effect of designed interventions.

Mediating psychosocial determinants of group discussions on shared sanitation users' cleaning behaviour

Effectiveness of discussions only

This study found that the effect of group discussions on shared sanitation users' cleaning behaviour was only being mediated through the normative factor of cleaning approval (Table 4). This finding shows that discussions were effective at positively influencing individual perceptions that their social networks or persons important to them would approve of their participation in cleaning shared sanitation facilities. The increase in perceived cleaning approval leads to positive change in behaviour performance. As showed in Table 2, the mean change in cleaning approval was increasing more in the discussion only condition compared to the control condition. This finding is comparable to that of a study of interventions to promote switching to arsenic–safe wells in Bangladesh, where injunctive norms were found to

effectively influence behaviour change (Inauen and Mosler, 2013). It is surprising that discussions only are not working through self-regulation factors (cleaning obligation, cleaning commitment and cleaning routine), ability factor (cleaning roster), and the attitude factor (cleaning affect). These three factors significantly influenced collective cleaning behaviour according to findings from the pre-intervention survey (Tumwebaze and Mosler, 2014a). This probably means that sometimes group discussions may need to be complemented with some other interventions such as commitment(Lokhorst et al., 2013). In this case, the addition of a commitment to group discussions boosted their performance on improving cleaning behaviour, as well as the performance of the psychosocial determinants.

Effectiveness of discussions plus commitment

As indicated above, adding a commitment to group discussions increases their effectiveness on improving self-reported cleaning behaviour by strengthening the performance of psychological determinants such as cleaning obligation, cleaning ease and cleaning affective determinants. These then mediate the effect of discussions on shared sanitation users' cleaning behaviour.

Firstly, shared sanitation can be maintained clean if users of the facility feel obligated to regularly participate in its cleaning. The combination of group discussions plus commitment made users of the shared facilities more obliged to participate in cleaning, leading to the actual increase in cleaning behaviour. The findings in Table 3 show that cleaning obligation – which is also referred to as personal norm in some studies (Sonego and Mosler, 2014) was improved by more than 1.6 times compared to the effect of group discussions alone. This finding of obligation being a mediator of group discussions effect on increased cleaning behaviour is also in line with research findings from a study conducted in Burundi where it was found to be an important predictor for habitual latrine cleaning behaviour (Sonego and Mosler, 2014).

Secondly, group discussions plus commitment enhanced the perceived ease of shared sanitation users to participate in cleaning their facilities, resulting in the increase in cleaning

behaviour. As indicated in Table 2, the mean change in cleaning ease is statistically significant over time and group compared to the control condition. It could be that group discussions plus commitment contributed to the reduction or minimisation of shared toilet users' perceived cleaning difficulties and increasing cleaning cooperation. It is reported in one of the previous studies that the lack of cleaning materials and cooperation affected their cleanliness (Tumwebaze et al., 2014). In addition, a study on determinants of shared toilets' cleanliness found that toilets were more likely to be kept clean if users believed that their cleaning was easy (Tumwebaze, 2014).

Thirdly, the effect of group discussions plus commitment is mediated by cleaning affective belief. The addition of commitment to group discussions strengthens shared toilet users' perceived liking to clean their facilities which in turn leads to increase in the performance of the behaviour. The findings in Table 3 show that commitment leads to an attitude change towards the cleaning of shared facilities as is indicated by the increasing change in means over time and group. This finding of the added effect group discussions plus commitment have on shared sanitation users' cleaning behaviour is comparable to other studies on commitment-making strategies in environmental research that have shown that the addition of commitment to other treatments (interventions) leads to more effective change in behaviour compared to non-commitment groups (Lokhorst et al., 2013). However, while the mediation effect of cleaning affective belief is positive on a one to one mediation analysis, the mediation effect in presence of other mediation factors is reduced. We think that there is a suppressor effect that in future should further be investigated.

Additionally, though group discussions plus commitment have a positive effect on the cleaning commitment determinant (Table 4, a path), as also indicated by the change in means (Table 3), the effect did not mediate the increase in cleaning behaviour. Some studies argue that social influences and the timings of the commitment could be the reasons why sometimes commitments lead to limited or unfavourable effects (Inauen and Mosler, 2013).

Lastly, although having cleaning as a daily routine activity not mediate group discussions' effect on shared sanitation users' cleaning behaviour, group discussions had a positive influence on increasing shared toilet users' cleaning routine, especially with the addition of commitment, as indicated by a path results in Table 4. It maybe that cleaning routine was not largely emphasized during discussions. In future, group discussions should be guided to include this factor in the discussions.

Implications for practice and future research

First, findings from this study have shown that theory and evidence-based group discussions can be effective in improving the cleaning behaviour of shared sanitation facility users. We suggest that group discussions are initiated by practitioners in behaviour change promotions in urban slums. It creates an opportunity for people to talk with each other on issues regarding the use and maintenance of shared facilities, especially in urban environments where sometimes people rarely talk to each other. Evidence from social dilemma research shows that communication, especially face-to-face, is effective for enabling collective cooperation among users of goods in social dilemmas (Balliet, 2010).

Secondly, this study has shown that it is important that group discussions are supplemented by an addition of commitment at the end of a discussion for them to be more effective in influence behaviour change.

Thirdly, it is important that group discussions also include cleaning arrangements such as integration of cleaning of shared sanitation facilities as part of routine activities and having cleaning rosters by each of the toilet user families. While it may not have been discussed in our study interventions, we think they could also be influential in increasing cooperation of the families' participating in cleaning the shared facilities, as well as their remembering when to clean.

Fourthly, it is important that group discussions are repeated for them to be effective, especially in situations where there is frequent movement of slum residents from one location to another as new tenants occupy the households. In our study, more than a third of the respondents had moved to new areas at the time of our follow-up.

Furthermore, group discussions require more time for mobilization of users of the shared facilities to be present for the discussions. People in the slums are always mobile and difficult to mobilize all at the same time since they are often engaged in looking for money for their survival – mostly through causal labour find of employment. During the intervention, the SSWARS team, together with village health workers or local leaders went from household to household to establish when the majority of study participants would be available to meet for the discussions with each other.

Lastly, for future research, we recommend that more longitudinal theory and evidenced-based intervention studies in this field be conducted, taking into account the application of the same theoretical factors in different urban slum contexts. This will provide validation and probably more evidence on the effect of group discussions and discussions plus commitment in different slums environments. It is important to note that interventions have to always target particular determinants, which are established to influence the target behaviour prior to their design and implementation. We could not adequately compare the findings of our study with those of other researchers since we found no intervention studies that focused on this topic of shared sanitation users' cleaning behaviour.

Conclusion

This study revealed that group discussions, especially when supplemented with a commitment, can be effective for improving the cleaning behaviour of shared sanitation users and strengthening the behavioural factors, such as cleaning approval and cleaning obligation. The interventions also increased peoples' liking to clean shared toilets and reduced perceived difficulties associated with cleaning. This study is particularly important in regard to the current

WASH post – 2015 proposal to have some shared sanitation facilities categorized as improved if a facility is not shared by more than five families (WSSCC, 2014). The cleanliness of shared sanitation facilities is instrumental in improving the health and wellbeing of urban slum dwellers since these are the facilities accessible to the majority of the population. In addition, irrespective of the number of user families – though research shows that the fewer the number of user families the more the likely facility cleanliness, intervention strategies that target to increase facility users' cleaning behaviour could lead to increased cleanliness. However, more theory and evidence-based intervention research is required to guide development agencies and governments to the right strategies and interventions to adopt that promote the cleaning of shared sanitation facilities by users.

Table 1: Question items for shared sanitation users' cleaning behaviour and psychosocial behavioural determinants

Factor block	Variables	Question wording	Lowest value	Highest value
Behavioural factor	Cleaning behaviour	How frequent do you participate in cleaning your shared toilet?	1 = never	5 = every day or more often
Risk factors	Disease vulnerability	How certain are you that you could get sick if you used a dirty toilet?	1 = impossible	5 = very certain
	Disease severity	Imagine you contracted a disease like cholera, how severe would be the impact on your social life?	1 = not severe	5 = very severe
Affective factor	Cleaning affect	How do (would) you feel to clean a shared toilet?	1 = I dislike it very much	9 = I like it very much
	Time cost	How time consuming is it for you to participate in cleaning your shared toilet?	0 = very time-consuming	4 = not time-consuming at all
	Cleaning effort	How effortful is it for you to participate in cleaning your shared toilet?	0 = very effortful	4 = not effortful at all
Normative factor	Cleaning families	Other than your own family, how many of the other shared toilet user families participate in its cleaning?	1 = (Almost) nobody (0%)	5 = (Almost) all of them (100%)
	Cleaning approval	In general, do you think most people important to you disapprove or approve that you participate in cleaning your shared toilet?	1 = very strongly disapprove	9= very strongly approve
	Cleaning obligation	How much do you feel obligated to participate in cleaning your shared toilet?	1 = not at all obligated	5 = very strongly obligated
Ability factors	Cleaning cooperation confidence	How confident are you that households you share with a toilet cooperate in its cleaning?	1 = not confident	5 = very confident
	Cleaning ease	How difficult is it for you to participate in cleaning your shared toilet?	0 = (almost) impossible	4 = not difficult at all
	Cleaning roster	Do you and other households have any detailed schedule or roster regard when to clean the shared toilet?	1 = not at all	5 = very much detailed schedule
Self-regulation factors	Habit	How much do you feel as a matter of habit to participate in cleaning your shared toilet?	1 = not at all a habit	5 = very strong habit
	Cleaning routine	Is participating in cleaning of your shared toilet part of your daily routine activities?	1 = not at all	5 = very much part of daily routine
	Remembering	How difficult is it to remember to participate in cleaning your shared toilet?	0 = (almost) impossible	4 = not difficult at all

Commitment	Do you feel committed to participate in cleaning your shared toilet?	1 = not committed at all	5 = very committed

Note: original scales ranging from 0 to 4 or 1 to 5 for the unipolar variables and 1 to 9 for the bipolar variables were transformed to scales ranging from 0 to 1 and -1 to 1, respectively during the analysis for easy interpretation of the results.

Table 2: Mean change and F- values of shared sanitation users' cleaning behaviour and psychosocial behavioural determinants

		No discussion			Discussions only			Discussions + commitment			GLM: F- value (Discussions vs no discussions)			GLM: F- value (Discussions + commitment vs no discussions		
	Time period (T)	T1	T2	T2-T1	T1	T2	T2-T1	T1	T2	T2-T1	Group (G)	Time	T*G	Group (G)	Time	T*G
RANAS factors	**Variables**															
Behaviours	Cleaning behaviour	.71	.79	.09	.64	.89	.25	.58	.88	.30	0.14	13.84***	3.21†	0.67	14.71***	4.40*
Risk	Disease vulnerability	.81	.83	.03	.79	.84	.05	.79	.81	.02	0.13	3.59†	0.32	0.98	1.48	0.04
	Disease severity	.91	.83	-.09	.86	.86	.00	.90	.86	-.04	0.09	4.21*	4.21*	0.15	9.80**	1.65
Attitude	Cleaning affect	.08	.56	.49	.07	.71	.64	-.32	.53	.85	0.40	38.89***	0.75	3.21†	55.88***	4.17*
	Time cost	.15	.96	.80	.22	1.00	.78	.23	1.00	.76	1.86	393.88***	0.10	2.19	357.83***	0.22
	Cleaning effort	.23	.95	.72	.26	.99	.73	.31	1.00	.68	0.56	289.85***	0.02	2.23	245.09***	0.17
Normative	Cleaning families	.58	.68	.10	.52	.80	.28	.49	.80	.31	0.36	8.82**	0.81	1.43	10.69**	2.09
	Cleaning approval	.49	.60	.11	.29	.76	.47	.48	.71	.23	0.05	13.67***	5.12*	0.33	4.75*	0.53
	Obligation	.58	.68	.10	.56	.77	.21	.41	.75	.34	0.72	10.04**	1.60	1.08	25.26***	8.01**
Ability	Cleaning cooperation	.68	.61	-.07	.36	.73	.37	.40	.75	.35	1.47	11.57**	13.26***	0.47	11.24**	12.98**
	Cleaning ease	.30	.93	.63	.53	.97	.44	.58	.96	.38	8.39**	116.84***	3.64†	9.91**	93.21***	5.65*
	Cleaning roster	.09	.19	.09	.13	.34	.21	.18	.40	.22	3.67†	8.49**	1.25	7.99**	10.56**	1.70
Self-regulation	Habit	.62	.67	.05	.55	.79	.24	.45	.74	.29	0.35	9.39**	4.08*	1.46	13.65***	6.85*
	Cleaning routine	.54	.59	.04	.55	.67	.13	.37	.65	.28	0.67	3.10†	0.67	1.32	11.33**	5.51*
	Remembering	.16	.95	.79	.23	.96	.73	.28	.96	.67	0.96	346.28***	0.51	3.19†	250.96***	1.69
	Commitment	.63	.74	.11	.59	.79	.20	.41	.79	.38	0.01	14.20***	1.31	2.80†	30.70***	9.28**

Note: N = 40 respondents for non-discussion groups, 38 respondents for discussion groups and 41 respondents for discussions + commitment . T1(pre-intervention survey) and T2 (cleaning interventions follow-up study) show mean values of the variables in the two-time periods respectively, and T2 – T1 shows the change in means from the two-time periods. The F-values of the General Linear Models (GLM) for repeated measures show ratios explained by the effect of the change in cleaning. Significance levels are indicated as follows: *** = p<.001, ** = p<.005, * = p<.05 and † = p<.10

Table 3: Comparison of group discussions only and group discussions plus commitment mean change and F- values of shared sanitation users' cleaning behaviour and the psychosocial behavioural determinants

		Discussions only			Discussion + Commitment			GLM: F- value - Discussions + commitment vs discussions only		
	Time period (T)	T1	T2	T2-T1	T1	T2	T2-T1	Group (G)	Time	T*G
RANAS factors	**Variables**									
Behaviours	Cleaning behaviour	.64	.89	.25	.58	.88	.30	1.98	77.00***	1.82
Risk	Disease vulnerability	.79	.84	.05	.79	.81	.02	0.40	3.40†	0.71
	Disease severity	.86	.86	.00	.90	.86	-.04	0.53	1.12	1.12
Attitude	Cleaning affect	.07	.71	.64	-.32	.53	.85	6.34*	73.20***	1.42
	Time cost	.22	1.00	.78	.23	1.00	.76	0.03	370.43***	0.03
	Cleaning effort	.26	.99	.73	.31	1.00	.68	0.74	239.97***	0.29
Normative	Cleaning families	.52	.80	.28	.49	.80	.31	0.27	25.81***	0.67
	Cleaning approval	.29	.76	.47	.48	.71	.23	0.74	16.33***	1.99
	Obligation	.56	.77	.21	.41	.75	.34	4.01*	44.62***	2.33†
Ability	Cleaning cooperation	.36	.73	.37	.40	.75	.35	0.33	57.87***	0.05
	Cleaning difficulty	.53	.97	.44	.58	.96	.38	0.11	58.62***	0.31
	Cleaning roster	.13	.34	.21	.18	.40	.22	1.12	15.11***	0.01
Self-regulation	Habit	.55	.79	.24	.45	.74	.29	3.24†	43.43***	0.55
	Cleaning routine	.55	.67	.13	.37	.65	.28	4.26*	21.72***	3.19†
	Remembering	.23	.96	.73	.28	.96	.67	0.38	225.65***	0.44
	Commitment	.59	.79	.20	.41	.79	.38	4.17*	45.72***	3.99*

Note: N = 40 respondents for non-discussion groups, 38 respondents for discussion groups and 41 respondents for discussions + commitment . T1 and T2 show mean values of the variables in the two-time period respectively and T2 – T1 shows the change in means from the two-time period. The F-values of the General Linear Models (GLM) for repeated measures show ratios explained by the effect of the change cleaning . Significance levels are indicated as follows: *** = p<.001, ** = p<.005, * = p<.05 and † = p<.10

Table 4: Multiple mediation analysis of the indirect effects of group discussions on cleaning behaviour

		Discussions only					Discussions + commitment				
				Indirect effects(a*b path; 95% CI)					Indirect effects(a*b path; 95% CI)		
RANAS factors and Variables		**a path**	**b path**	**LL**	**β**	**UL**	**a path**	**b path**	**LL**	**β**	**UL**
Risk	Disease vulnerability	.03	-.05	-.03	-.00	.01	-.01	-.12	-.01	.00	.03
	Disease severity	.08†	-.02	-.03	-.00	.02	.05	-.29†	-.06	-.01	.00
Attitude	Cleaning affect	.15	-.02	-.05	-.00	.01	.38*	-.12*	-.14	-.05	-.01
	Time cost	-.04	-.25*	-.03	.01	.07	-.04	-.34*	-.04	.01	.11
	Cleaning effort	-.00	.05	-.03	-.00	.02	-.04	-.01	-.03	.00	.04
Normative	Cleaning approval	.37*	.17***	.01	.06	.16	.16	-.03	-.06	-.01	.02
	Obligation	.11	.76***	-.03	.08	.30	.23**	.55*	.01	.13	.40
Ability	Cleaning ease	-.20*	.05	-.06	-.01	.01	-.22*	-.17†	.00	.04	.14
	Cleaning roster	.08	-.03	-.04	-.00	.01	.13	-.14†	-.08	-.02	.00
Self-regulation	Habit	.18†	-.08	-.13	-.02	.03	.23*	.34†	-.03	.08	.29
	Cleaning routine	.07	.13	-.01	.01	.09	.24*	.06	-.04	.02	.13
	Remembering	-.07	-.11	-.01	.01	.07	-.12	.09	-.09	-.01	.01
	Commitment	.11	-.25	-.12	-.03	.01	.27**	-.15	-.19	-.04	.06

Note: N=119, Effects of discussions only on cleaning behaviour (Total effects = 0.17†, Direct effects = 0.07, R^2 = 0.82), Discussions + commitment on cleaning behaviour (Total effects = 0.24*, Direct effects = 0.08, R^2 = 0.72). a path = effects of the interventions on the mediators (psychological determinants) and b path = effects of the mediators on self-reported cleaning behaviour. Indirect effects were calculated by bootstrapping (significant effects highlighted in bold). β = unstandardized regression coefficients; CI = confidence interval; LL = lower limit, UL = upper limit. Significance levels are indicated by; *** = p≤.001, ** = p≤.005, * = p≤.05 and † p≤0.10

General discussion

Study findings

Overall, we can deduce from the four studies that psychological and social dilemma factors influence the cleaning behaviour of shared toilet users and that theory-based behaviour change interventions, such as group discussions, can be effective in increasing shared toilet users' cleaning behaviour. The findings in the presented studies suggest that communication among users of shared facilities is important in fostering their cleaning behaviour.

Study 1 explains the determinants that influence households' cleaning intention for shared toilets in 50 studied slums based on two guiding questions.

The first research question was to establish the cleanliness of the shared toilets by asking (Q1): **How clean are households' shared toilets in Kampala's urban slums?** This study has shown that the majority of the population in the five divisions of Kampala were using dirty toilets. Of the interviewed households, only 1 to 2 respondents in every 10 households reported having a clean toilet. These findings are similar to those from other related studies that have shown that cleanliness of shared toilets is major challenge, especially if used by many families (Günther et al., 2012, Maksudur Rahman et al., 2010, Buttenheim, 2008). Most of the people interviewed in this study mentioned the lack of cleaning cooperation among user families and of the availability of cleaning materials as the main reasons for the dirty facilities. This seems to imply that a number of the users' of the facilities are not engaged in cleaning since other families are not cooperative or a user who is willing to clean is hindered by the lack of cleaning materials, such as water, brooms or detergents.

The second research question shows the psychological factors that influenced households' cleaning intentions. This was done by asking (Q2): **Which are the determinants for households' cleaning intention for shared toilets in urban slums?** The study findings in regard to this question showed the following factors as influencing households' cleaning

intention for their shared toilets. Firstly, the findings in this study seem to suggest that persons who perceive cleaning shared toilets as requiring less effort (instrumental belief) are more likely to clean the shared toilet than others. This might commonly be the case if a person shares a toilet with cooperative families or the facility is being used by few families or there are commonly cleaning materials. Secondly, people who perceive themselves as able to keep their shared toilets clean (self-efficacy) are more likely to clean than those who perceive it to be difficult. During interviews, some participants mentioned that even when one cleans, it always takes no time for the toilet to be soiled by some careless users. Thirdly, the findings in this study further appear to suggest that people who communicate with each other on issues regarding the cleaning or good use of the shared toilet are more likely to clean than those who do not talk to each other. It is probable that if people always communicate with each other, cooperation among them could influence their cleaning intentions and resulting participation in cleaning shared toilets. As social dilemma studies indicate, communication is essential in fostering cooperation (Balliet, 2010, Frohlich and Oppenheimer, 1998, Kerr and Kaufman-Gilliland, 1994). In addition, this study's findings seem to indicate that people are more likely to clean a shared toilet if they believe that using a clean toilet is important (personal norm), such as to their health. This finding is similar to those in some studies that show that individuals are more likely to perform a behaviour if they believe performing it leads to positive benefits (Sonego and Mosler, 2014, Bratt, 1999, Dawes, 1980). Lastly, findings in this study also appear to suggest that persons who perceive cleaning of a shared toilet to be a regular and spontaneous routine (habit) are more likely to clean than others. During data collection, most people mentioned that cleaning was something they do regularly because they like to use clean toilets and do not want to suffer from diseases. In a nutshell, the general findings from this study seem to suggest that households' cleaning intentions for shared toilets could be improved through communication that could improve cleaning cooperation among toilet user families and the

availability of cleaning materials. Communication could also strengthen the performance of psychological determinants to foster cleaning intentions.

Following from Study 1, the findings showed lack of cooperation as one of the main reasons for the dirty shared toilets, and communication as an important determinant for households' cleaning intentions. Study 2 further explores how the cleaning dilemma of shared toilets can be explained from the social dilemma perspective. To explore how the social dilemma approach could help understand shared toilet users' collective cleaning behaviour, this study asked the following research question (Q3): **Which social dilemma factors aid to understand the collective cleaning behaviour of shared toilet users in urban slums?** This literature review study revealed important insights into how social dilemma factors could be of relevance in understanding the cleaning behaviour of shared toilet users. While none of the reviewed literature directly focused on cleaning behaviour, several studies indicate that communication is fundamental in fostering the cooperation and promotion of collective actions that are essential to resolving social dilemmas (Bouas and Komorita, 1996, Balliet, 2010, Bornstein et al., 1989, Kerr and Kaufman-Gilliland, 1994, Frohlich and Oppenheimer, 1998). Secondly, the emphasis on the importance of social norms or the behaviour of others in influencing individuals' decision-making processes may be applicable to the cleaning situation of shared toilets, as evidenced in other sanitation and hygiene behaviour change studies (Curtis et al., 1997, Curtis et al., 2009, Waterkeyn and Cairncross, 2005). Social dilemma studies have shown that social norms are important in fostering cooperation and even more if frequently re-activated, such as through communication, for people to keep following them (Biel and Thøgersen, 2007, Biel et al., 1999, Bicchieri, 2002). Furthermore, the social dilemma emphasis on the behaviour of others could be of interest in understanding the cleaning behaviour of shared toilet users. Evidence has shown that people tend to make decisions on where to cooperate or not depending on how they interpret the behaviour of other individuals (Kelley and Stahelski, 1970, Bogaert et al., 2008, Brucks and Mosler, 2011). It is likely that people will

most likely adopt cooperative behaviours if the majority are cooperative (Declerck et al., 2014). Lastly, social dilemma studies indicate that communication is more effective in fostering cooperation if occurring in small rather than large groups (Bornstein et al., 1989, Hamburger et al., 1975, Liebrand, 1984). Again, social dilemma findings seem to suggest that communication could be essential in the promotion of collective behaviours, such as the cleaning of shared toilets by their users. Based on these findings, Study 3 combined social dilemma and RANAS factors to investigate shared toilet users' cleaning behaviour.

Study 3 applies an integrated questionnaire of the RANAS and social dilemma factors to assess shared toilet users' collective cleaning behaviour and the determinants influencing their behaviour, as indicated in the last sentence of Study 2's findings above. In addition, this study also found that a number of shared toilets were dirty and more than half of the facility users were not participating in their daily cleaning. Again, the lack of cooperation and the big number of user families were reported as the main reasons for the dirty toilets. Two research questions were used to guide this study.

The first research question on the behavioural determinants influencing shared toilet users' collective cleaning behaviour stated (Q4): **Which psychosocial and social dilemma determinants influence the collective cleaning behaviour of shared toilet users in Kampala slums, Uganda?** This study's findings reveal the following factors as meaningfully influencing shared toilet users' collective cleaning behaviour. Firstly, the dislike to clean a shared toilet (affective belief) seems to suggest that people who dislike cleaning a shared toilet are less likely to participate in its cleaning than others. During interviews, some participants mentioned that they disliked cleaning shared toilets because it is disgusting to clean other people's dirt. Some other reasons mentioned why cleaning shared toilets was disliked include lack of cooperation and the soiling of the facilities shortly after they are cleaned. Secondly, the availability of a cleaning roster among toilet sharing households (self-efficacy) appears to imply that people are less likely to participate in cleaning if their households do not have cleaning rosters. During

interviews, some participants mentioned that they had cleaning rosters which indicated when the toilet user was supposed to be cleaning – some of the rosters that we were able to see were pinned in the toilets. Thirdly, cleaning of the shared toilets being reported as part of ones' daily routine (action planning) suggests that people to whom cleaning is perceived to be part of their daily routine activities are more likely to participate in cleaning than others. However, this was common mostly among female respondents, who spent most of their time at home. Some respondents mentioned that cleaning was not part of their daily routine activities because most of the time they are never home. Fourthly, remembering when to clean (remembering) implies that people are more likely to participate in cleaning their shared toilets than others if they find it less difficult to remember when they ought to be cleaning. This could probably be the case in situations when shared toilet users are cooperative in cleaning, committed or have cleaning materials. Fifthly, commitment to participate in cleaning (commitment) suggests that people who perceive themselves as committed to cleaning the shared toilets are more likely to clean than those who are less committed. Some reasons mentioned during interviews for some participants who reported being committed to cleaning shared toilets included: the presence of young children in the household that use the toilets, a preference to use clean toilets, cooperation and the need to avoid diseases. Lastly, this study found that people who perceived themselves as cleaning their shared toilets more than the other users are more likely to participate in cleaning than those who perceive themselves to clean less than the others. This could mainly be in situations where some shared toilet users spend most of the days at home than others. Other than the perceived cleaning frequency, which is a social motive factor of the social dilemmas, the rest of the factors are RANAS determinants.

However, as indicated by the second research question in this study, most social dilemma factors had an important influence on shared toilet users' cleaning commitment. This was assessed by the following question (Q5): **Which social dilemma factors influence shared toilet users' cleaning commitment?** The findings to this question reveal that social dilemma

factors are important predictors for shared toilet users' cleaning commitment. The most important were: This study found that people are more likely to be committed to participate in cleaning a shared toilet if they perceive themselves as cleaning more than the other users. As indicated above, the reasons for such perceived belief may relate to some shared toilet users spending all or most of the time home than others or users who feel that others do not cooperate enough in terms of cleaning. Secondly, this study found that shared toilet users are more likely to be committed to cleaning if they have good relations with the other sharing households. During data collection, it was common for participants to mention that their toilets were clean because they had good relationships with the other user families, while others said their relationships with the other toilets users was bad because of their lack of cooperation in cleaning the toilet. Thirdly, this study also found that people are more likely to be committed to participate in cleaning a shared toilet if they always communicate with the other users of the facility and find it easy to discuss with them about the cleaning and good using of the shared toilet. Overall, Study 3's findings suggested again that communication is an important factor on individuals' commitment to perform a behaviour. Thus, it is probable that behavioural change intervention strategies, using communication, could be effective if applied to address the lack of cooperation among users of shared toilets. This intervention could also have positive effects on the psychological determinants that could increase the cleaning behaviour of shared toilet users.

Study 4 explains the effectiveness of group discussions on shared toilet users' cleaning behaviour and the psychological behavioural determinants. The cleaning interventions that are evaluated in this study were designed following the findings of Study 3. It was suggested that communication interventions, directed towards improving cleaning cooperation among users of shared toilets and strengthening the performance of the behavioural psychological factors, could be effective at increasing cleaning behaviour. Following the suggested interventions in Study 3, group discussions and discussions plus a commitment were implemented among families found with dirty toilets in Study 3. As a follow-up to the tested cleaning interventions, this study used

four guiding questions to evaluate their effectiveness on cleaning behaviour and their effects on the psychological determinants.

The first research question analyses the change in means of shared toilet users' cleaning behaviour and the behavioural determinants. This was done by asking the following question (Q6): **Do group discussions change shared sanitation users' cleaning behaviour and the psychosocial behavioural determinants?** The study findings indicate that group discussions were able to change shared toilet users' cleaning behaviour, as well as the behavioural determinants. The psychosocial determinants with the most important increase in mean changes over time and group included the following: The perception of disease severity increases more in people who are certain that contracting a disease like cholera leads to serious consequences on their lives. It seems that communication between users of the shared toilets reinforced their awareness about the negative consequences associated with dirty toilets, such as diseases – in case the of cholera, that may lead to morbidity or mortality. With strong perceived severe consequences of a disease outbreak associated with using a dirty toilet, it is likely that people will be motivated to clean to avoid getting diseases. Secondly, the perception of cleaning approval increases more in people who believe that other people who are important to them approve of their participation in cleaning the shared toilets. This finding seems to suggest that people communicating with each other can lead to the strengthening of their social values and of the realization that people would support their cleaning behaviour. The reason for this change may be that through discussions, people emphasized the importance to cooperate in cleaning, as well as why it is important to use clean facilities. It is probable that collective cleaning of shared toilets can be realized if communication strengthens users' perceived social norm that others approve that they participate in cleaning. Thirdly, the perception of cleaning confidence by other households increases more in people who are confident that the other toilet sharing families participate in their cleaning. This is comparable to findings from other studies which have reported that individuals are more likely to be cooperative in decision making if

they believe others will be cooperative (Balliet and Van Lange, 2013, Kelley and Stahelski, 1970, Nettle et al., 2011). Some studies further indicate that, in situations where most people are cooperative, those who are initially non-cooperative are influenced to cooperate as a result of others positive behaviour (Declerck et al., 2014). Lastly, the perception that cleaning a shared toilet is a matter of habit increases more in people who feel that cleaning is something done regularly. It appears that through people communicating with each other, they realized the need for more and regular participation in the cleaning of the facilities. For example, communication might have boosted their cleaning cooperation, leading to increased motivation to habitually clean the shared toilets.

The second research question of this study shows the added advantage of adding a commitment to a discussion. This was answered by asking (Q7): **Does adding a commitment after the discussion have additional effects on changing cleaning behaviour and the psychosocial behavioural determinants?** The study findings show that adding a commitment to discussions leads to added change in shared toilet users' cleaning behaviour and in the psychosocial behaviour determinants. The determinants with the most positive change include the following: The perception of cleaning affect increases more in people who feel that cleaning a shared toilet is something they like to do. The cleaning of a shared toilet by users may be a likable activity if cleaning is associated with positive emotional feelings, such as the comfort arising from using a clean toilet (positive affective belief) or other users being cooperative in cleaning. This finding shows that through shared toilet users communicating with each other and each pledging to participate in cleaning after meeting, their affect to clean was strengthened. Secondly, as reported in Q6 above, the perception of cleaning confidence increases more in people who are confident that the other toilet sharing families participate in its cleaning. This seems to imply that people are likely to participate in cleaning shared facilities if they believe other users will do the same. Communication between toilet users and the commitment might have strengthened people's trust of every user's participation in cleaning

which boosted their cleaning confidence. This finding is similar to what is reported in social dilemma studies regarding the influence of other's behaviour on individual cooperation (Kelley and Stahelski, 1970, Bogaert et al., 2008, Brucks and Mosler, 2011). In addition, evidence from social dilemma studies also indicates that trust is essential in fostering cooperation, as well as in individual's change in behaviour from non-cooperative to cooperative states (Rothstein, 2000, De Cremer et al., 2001). Thirdly, the perception of cleaning ease increases more in people who find cleaning not difficult. It seems that through communication and commitment to participate in cleaning inhibiting their participation in cleaning, such as the lack of cleaning cooperation and of cleaning materials are resolved, prompting them to engage in cleaning. As indicated in Study 1, the lack of cleaning cooperation and the availability of cleaning materials were the main reasons reported for the dirty shared facilities (Tumwebaze et al., 2014). Fourthly, as mentioned in Q5, the perception that the cleaning of a shared toilet is a matter of habit increases more in persons who feel that cleaning is something that is part of them, i.e., that is done regularly. It appears that through people communicating with each other, they realized the need for more and regular participation in the cleaning of the facilities. It seems people are more likely to have stronger cleaning habits of shared toilets if they communicate with each other as users of the shared facilities and commit themselves to cleaning them. Fifthly, the perception of cleaning obligation increases more in people who feel strongly obliged to clean. This seems to suggest that when people communicate with each other on the way they use or clean their toilets, and commit to cleaning them, they are more likely to feel obligated to clean if they perceive cleaning as a norm and associate it with positive attributes, such as the convenience to use a clean toilet or to prevent diseases associated with dirty toilets (Sonego and Mosler, 2014, Tumwebaze et al., 2014). Similarly, evidence from social dilemma research indicates that people may conform to a social norm if they find it legitimate or reasonable (Dawes, 1980, Thøgersen, 2008). Furthermore, the perception of cleaning routine increases more in people who have cleaning as part of their daily activities. During data collection interviews, the lack of

cooperation with the other households was commonly mentioned as the reason why cleaning was not part of some individuals' daily routine activities. Other anecdotal reasons included not being at home most of the time, children doing the cleaning and the landlord being in charge of cleaning. Lastly, the perception of commitment increases more in people who feel committed to participating in cleaning the shared toilets. As with the personal norm, it is likely that people feel more committed to perform a behaviour if they associate the behaviour with certain benefits or if they believe it is the right thing to do. It is probable that people become more committed to participate in cleaning shared toilets if they communicate with each other and if each of them declares their public commitment. During group discussions, some participants declined to sign commitment forms, arguing that they did not want to be imprisoned if they failed to comply. However, they were always assured that it was for their own records. In another group discussion in which participants refused to sign commitment forms, the reason was their toilet lacked a toilet door. And their argument was that it would be difficult to keep such a toilet clean. In this situation, the SSWARS team together with the support of the village local leader, mobilized the users and the landlord to buy a door and have it put on their toilet.

The third research question of this study shows the mediation effect of group discussions on shared toilet users' cleaning behaviour working through the psychological determinants. This was answered with the question that stated (Q8): **How do group discussions work with regard to psychosocial behavioural determinants?** The findings in this study revealed that the effectiveness of group discussions on shared toilet users' cleaning behaviour is working mainly through the cleaning approval determinant. Specifically, discussions strengthened the performance of the perceived cleaning approval among shared toilet users that people important to them approve their participation in cleaning. This improvement in the perceived cleaning approval determinant mediates the effects of group discussions on cleaning behaviour. The cleaning approval social norm, mediating the effectiveness of discussions on cleaning behaviour, may have been a result of the counteractive communication among the

toilet users. During discussions, it was common for participants to emphasize the need for each families cooperation in cleaning, as well as crediting or scrutinizing each other's engagement. It is probable that because of these discussions, shared toilet users were able to re-internalize their social values and the expectations of others, which might have contributed to the change in behaviour. Secondly, the cleaning approval effect might also have been due to the influence of the local leaders or village health workers who moderated the discussions. Since they are in positions of authority and command respect in the respective villages, their emphasis on the importance of cleaning and each user's participation during the discussions might have contributed to strengthening shared toilet users' belief of their approval to clean the shared toilets. While discussions also had effects on the confidence in the cooperation of other toilet users to participate in its cleaning and their perceived ease to clean shared facilities, they might only be contributing to the total effects of change in cleaning behaviour but are not mediating the change.

The fourth research question of this study shows if the addition of commitment to discussions increases their performance on the psychological determinants, resulting in increased change in cleaning behaviour. This was assessed by the question (Q9): **Does adding a commitment after the discussion make them work differently?** In regard to this question, the study findings show that the addition of a commitment to discussions leads to their added effectiveness in increasing shared toilet users' cleaning behaviour, working through more psychological determinants. The psychological determinants through which discussions plus commitment worked include the following: The discussions plus commitment effectiveness on shared toilet users' cleaning behaviour was mediated by a cleaning affective belief determinant. As indicated in Q7, through discussions and public commitment to cleaning, shared toilet users increased their liking to clean the shared facilities. It seems that when user families communicate face-to-face with each other the issues affecting the cleanliness of their toilets, and internalize their cleaning behaviours and importance that they clean, as well as the sign

public commitment forms pledging to participate in cleaning, they develop more liking to participate in cleaning, leading to increase in their cleaning behaviour. Secondly, discussions plus commitment effectiveness on shared toilet users' cleaning behaviour was being mediated by the obligation determinant. Again, as argued in Q7, it seems that people are more likely to feel obligated to clean shared toilets when they perceive cleaning as a personal norm and associate it with positive outcomes, such as convenience and comfort to use a clean toilet or to prevent diseases associated with dirty toilets. It is possible that communication between users of the shared toilet families when supplemented with a public commitment made them feel more obligated to participate in cleaning – they probably became more confident in each other's participation in cleaning. Lastly, discussions plus commitment effectiveness on cleaning behaviour seemed to be working through the determinant of shared toilet users' perceived ease to clean the facilities. It may be that through shared toilet users' communication with each other, some challenges commonly mentioned that affect the cleanliness of the facilities, such as the lack of cleaning cooperation or of cleaning materials, might have been resolved, prompting their participation in cleaning.

Overall, the findings in Study 4 suggest that communication is effective in increasing shared toilet users' cleaning behaviour and strengthening the performance of the psychological behavioural determinants, especially if supplemented with a commitment.

Limitations and future research

The factors of the studies used in this dissertation might not always perfectly fit all the factor blocks of the RANAS model or the inclusion of all social dilemma factors. Only those we thought as most relevant in the context of cleaning of the shared toilets were included. With regard to the RANAS model, for example, the ability factors of self-efficacies, such as self-recovery, were rarely assessed. Although he descriptive norm was assessed, a number of respondents did not know how many of their neighbours with whom they share a toilet

participate in its cleaning. The habit factor that is outcome determinants in the RANAS model is used as predictor in the studies presented. Variable labelling for most of the factor blocks were contextualized to the setting of the study and may not perfectly fit the RANAS labels, though the target measure of the construct is the same. However, the RANAS model by and large was suitably applicable to this research and will provide a good basis for future research that could systematically integrate all the components of the RANAS, as well as context variables that may also influence collective behaviours.

Secondly, due to the limited or non-existent previous investigations, to our knowledge, on shared toilet users' cleaning behaviour from the theoretical and evidence-based perspective, the possibility to compare our findings with those of previous studies were very limited. Thus, more research in this field could offer better comparative analysis in the future, as well as establishing other findings and interventions influential in increasing shared toilet users' cleaning behaviour.

Thirdly, while the RANAS factors accounted for a greater variance of shared toilet users' cleaning behaviour, the integration of the social dilemma factors increased its robustness. We recommend that research targeting collective behaviours, such as cleaning of shared toilets, integrates social dilemma factors into their behavioural working models since individual behavioural decisions for which most psychological factors are based are also influenced by the behaviour of others or situations outside the control of the individual.

Implications for practice

The knowledge gained from these studies provides insights to aid the development of strategies aimed at increasing shared toilet users' participation in their cleaning.

How to identify the right factors that influence the cleaning behaviour of shared toilet users

For any successful behaviour change promotion, it is important to know which factors influence the targeted behaviour. The first three studies shown that cooperation is an important factor that should not be ignored, especially when planning interventions that focus on collective behaviours, such as the cleaning of shared toilets. The likelihood for families' engagement in cleaning or feeling obligated to participate in cleaning is high if all families are cooperative.

Secondly, the studies showed that it is important for practitioners to assess a wide range of behavioural factors and evaluate their influence on a target behaviour. For example, studies one and three have shown that shared toilet users' cleaning intentions and behaviour were being influenced by: perceived cleaning effort, feelings associated with the cleaning of shared facilities, communication among facility users, perceived cleaning importance, abilities to maintain a facility clean, cleaning regularity, cleaning routine, remembering when to clean and cleaning commitment. These imply that a mix of interventions or an intervention encompassing the mentioned factors would be effective at increasing shared toilet users' cleaning intentions and the actual cleaning itself. For instance, persuasive interventions could be used to change shared toilet users' perceived cleaning efforts and negative feelings associated with cleaning shared facilities (dislike to clean shared toilets), and to trigger communication among facility users to discuss the issues of cleaning and proper management of their facility. Normative interventions could be used to strengthen users' personal norms, such as emphasizing the importance of shared toilet users' participation in their cleaning. Ability interventions could be used to equip shared toilet users with the needed skills and confidence to strengthen their abilities to keep their facilities clean and at developing cleaning rosters to guide the cleaning participation by each of the toilet user families. Lastly, planning interventions and relapse prevention, such as action planning for users of shared toilets to make cleaning part of their

daily routine activities, that helps them remember when to clean, as well as being committed to participate in cleaning, would facilitate the continuity of shared toilet users' cleaning behaviour.

How to develop and successfully implement cleaning interventions to increase collective cleaning behaviour of shared toilet users

As indicated above, identifying the factors that influence a target behaviour would assist in the analysis of how an intervention should be designed and implemented so that it has a positive effect on changing behaviour. In regard to these studies, persuasive cleaning interventions (group discussions supplemented with a public commitment) were designed and implemented to increase shared toilet users' cleaning behaviour among families whose facilities were found to be dirty during Study 3. Group discussions enabled shared toilet user families to communicate with each other to address the issues affecting the cleanliness of their shared toilets and to re-evaluate themselves of their engagement or cooperation to clean the toilet, as well as to come up with resolutions to ensure their cleaning participation. The lack of cleaning materials, another challenge which was mentioned as hindering cleaning intentions and behaviour could also be discussed during the meetings. The role of the practitioners or researchers in these discussions is primarily to ensure that at least the majority of the shared toilet users are available for the meetings. Mobilization of the shared toilet users was made through liaison with the local leaders and village health workers. We recommend that the discussions be moderated by a local leader(s) in the respective area or by someone on the leadership committee. This is important regarding the issues about shared toilets that may be outside the users' abilities due to the fact that the majority are tenants. For example, one of the issues is emptying of toilets when they fill up. In most settings, it is the responsibility of the landlords to empty the toilets. If this is one of the main reasons affecting users' cleaning behaviour, the moderator, by virtue of their leadership role could follow up with the owners of the houses to have the facilities emptied. Secondly, since communication during these

discussions could end in defensive arguments and aggression, it is important to have moderators who are equipped beforehand on how to deal with such scenarios. In one of the group discussions, a male participant attacked and insulted a female participant after the meeting because she had blamed the males of not participating in cleaning and of buying cleaning materials, although they soil the toilet. This was reported to police and the person was arrested. The results of this meeting were that males more become cooperative and some started buying cleaning materials. However, most discussions did not result in extreme aggressive behaviour. By the end of most discussions, ideally which should not go beyond an hour, it is hoped that the toilet users would come up with solutions that stimulate their increased participation in cleaning. And, since a number of families in urban slums often move frequently from one location to the other, it may also be important that group discussions be repeated or followed up often in order to re-orient new tenants. once in a while for re-orientation of new tenants. However, although we did not do this, we recommend it to practitioners as it could enhance the sustainability and continuity of the performance of a behaviour. Lastly, as has been indicated in Study 4, the addition of a commitment at the end of discussions creates additional motivation to perform a behaviour. This is a voluntary kind of commitment in which members of the discussion group voluntarily pledge publicly and more-so in writing that they will always participate in cleaning their shared toilet.

How to evaluate the effectiveness of an intervention aimed at increasing the cleaning behaviour of shared toilet users

For any short or long-term behaviour change interventions, it is important to evaluate whether an intervention is or has been effective at changing a target behaviour, as well as the process behavioural determinants that influence the performance of the behaviour. This, however, means that before any interventions can be designed or implemented, a survey or simple needs assessment has to be conducted to ascertain which behaviour needs to be changed

and the factors that influence the behaviour. Depending on the nature of the interventions and the life span of the projects, evaluations can also help to modify or change an intervention if needed. In Study 4, we show that it is possible to measure whether the group discussions and group discussions plus a commitment were effective at improving shared toilet users' cleaning behaviour and through which behavioural factors the interventions were working.

Conclusion

It has been shown that theory and evidence-based behaviour change interventions are effective in the promotion of health behaviours, such as shared toilet users' cleaning. In this case, we have demonstrated that group discussions can be effective at increasing shared toilet users' cleaning behaviour, as well as improving the performance of the psychological determinants. Particularly important for the persuasive behavioural change techniques was the influence of group discussions on the liking of the clean shared toilet users to participate in their cleaning, especially when discussions were supplemented with a commitment, strengthening the personal norm factor of the users feeling obligated to clean and the perceived ease to clean the shared toilets. Group discussions were shown to be effective at increasing shared toilet users' belief that people important to them approve their participation in cleaning the shared toilets. It is important that behaviour change interventions are accompanied with a form of commitment as this research has shown that this strengthens the performance of a target intervention.

Secondly, this research provides new knowledge on the relevancy of theory in investigating sanitation and hygiene behaviours, such as the cleaning of shared toilets. The combination of the psychological and social dilemma factors provided a robust understanding of the collective cleaning behaviour change of the shared toilet users, as indicated in the studies presented. Specifically, the RANAS model of behaviour change was successfully able to predict the collective cleaning behaviour of shared toilet users. However, it is also important to note that some social dilemma factors could be integrated or added into the RANAS factors,

such as cleaning behaviour of others, communication, and the perceived efficacy factors, such as a shared toilet user's confidence in the cleaning cooperation of other households.

Lastly, as this research revealed, although using a dirty toilet exposes users to diseases, this risk factor alone does not influence behaviour change. This research showed that intervention strategies that have the aim to influence behaviour performance, such as shared toilet users cleaning attitudes, norms, abilities, and self-regulation to sustain the behaviour once being performed, are important. The interventions also need to primarily target the promotion of cooperation among users of shared toilets. Collective behaviours, such as the cleaning of shared toilets, are most likely to be achieved if there is cooperation among the users.

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Appendixes

Appendix A: Surveys questionnaire

Cleaning of shared toilets in Kampala's slum communities

A1. Number of households who refused interview before interviewed household? --------

A1. Omuwendo gw'amaka agagaana okubuuzibwa nge'ka eno teganabuuzibwa? .....

Please interview the head of the household or spouse

Introduction

Please introduce yourself

Weyanjule

Hello, My name is _____ and work with an NGO called Sustainable Sanitation and Water Renewal Systems (SSWARS), located in Mulago III, Kawempe Division. We are conducting a follow-up survey on cleanliness of shared toilets. I would request to interview you on the cleanliness situation of your shared toilet. It will take about 45 minutes. Do you have the time for the interview? We are also interviewing other households in this zone and other zones in Kampala. The results will be treated confidentially. We are not interested in any particular answers, just in the answers that really represent your opinion. We would like to know why people do what they are doing so that together, we can improve the cleanliness situation of shared toilets depending on the information given. It helps us most if you answer as honest and properly as possible.

Bannange, amannya gange nze _____ era nkola nekitongole ekyobwanakyewa ekiyitibwa Obuyonjo Obusaanidde n'Okuzaa Obujja Ebyamazzi (SSWARS) ekisangibwa mu Mulago III, mu Ggombolola ye Kawempe. Tunoonyereza ku buyonjo bwa kabuyonjo ezigabanibwa. Bwoba tofuddeyo, njagala okubuuza ku mbeera ya kabuyonjo zemugabana. Kijja kutwaala eddakiika 45. Olina obudde bwokubuuzibwa?

Tugenda kubuuza amaka amalala mu kitundu kino era ne bitundu ebirala mu Kampala. Byona ebinavaamu bijja kutwalibwa nga byakyaama. Tetwetaaga kuddamu kwonna ngabwolabye; twagala kuddibwamu nga bwolowooza ggwe. Twagala okumanya lwaki abantu bakola bwebatyo tusobole okwasiza awamu okutumbula embeera yobuyonjo yazikabuyonjoa ezigabanibwa nga tusinziira kundowooza zamwe. Kituyamba nnyo bwoddamu n'obwesimbu era mubutuufu ngabwosobola.

General information regarding the interview Start time……..……..

A2. Participant's ID ----------

A3. Participant part of the interventions.

1. Yes ☐ 2. No ☐

A4. Participant belonged to;

1. Control group ☐ 2. Open discussion group ☐ 3.Guided discussion group ☐

A5. Date of interview -----/-----/ ------ (dd/mm/yyyy)

Ennaku z'omwezi z'okubuuzibwa

A6. Name of interviewer ----------

Amannya g'abuuza ----------

A7. Interviewer number ……

Ennamba y'abuuza .....

A8. Division ----------

Ekitundu .....

A9. Parish ----------

Ekigo/Muluka .....

A10. Zone ----------

Akabondo ----------

Data of interviewed person

A11a. Name of the household head / spouse ……..

Amannya ga nannyini maka / omuntu wo ……

A11 b. If respondent not household head or spouse, state why the respondent was interviewed?

……..

A12. Gender

[1] ☐ Male [2] ☐ Female

A13. Age (complete years) ……

Emyaka (emyaka emijjuvu) .....

A14. Marital status

[1] ☐ Single [2] ☐ Co-habiting [3] ☐ Married [4] ☐ Separated / divorced

A15. Do you own or rent the household you live?

Amaka gobeeramu ga go oba opangisa?

[1] ☐ Own [2] ☐ Rent

A16. How long have you been living in this house?

Omaze bbanga ki ng'obeera mu nju eno?

[1] ☐ < 1 year [2] ☐ 1 to 2 years [3] ☐ 3 years plus

A17. Occupation----------

Omulimu ki gwo kola?----------

[1] ☐ Not employed [2] ☐ Civil or formal employment [3] ☐ Non formal employment [5] ☐ Other (specify) ……

A18. Religion

Eddiini .....

[1] ☐ Catholic [2] ☐ Protestant [3] ☐ Muslim [4] ☐ Other (specify) ……..

A19. Highest education level

Obuyigirize bwenkana ki?.....

[1] ☐ None [2] ☐ Primary [3] ☐ Secondary [4] ☐ Tertiary

A20. If employed / do some kind of business or work, estimated monthly income:

Oba okola, oyingiza kyenkana ki omwezi?

[1] ☐ < 51,000 [2] ☐ 51,000 to 100,000 [3] ☐ 101,000 to 150,000

[4] ☐ 151,000 to 200,000 [5] ☐ > 200,000 [88] ☐ > do know or no response

A21. How many people live in your household? …….. people

Abantu bameka ababeera mu maka go? .....

A22. How many of them are children below 5 years? …… children

Kwabo, abana bali bameka abali wansi we myaka etaano? ……..

A23. What is the sex and ages of the other members in your household?

1. …… ……
2. …… ……
3. …… ……
4. …… ……
5. ……...……
6. ……... ……
7. ……... ……
8. ……... ……
9. Stay alone

Sanitation situation

B1. Type of shared toilet used by household?

Kika ki kya kabuyonjo ekozesebwa amaka?

[1] ☐ flush toilet [2] ☐ pour flush [3] ☐ Ventilated Improved Pit latrine (VIP)

[4] ☐ Ecosan [5] ☐ Simple pit latrine

B2. Total number of households using the shared toilet, including your household ……. (**put 88 if he or she has no answer**)

B3. Total number of households that use the toilet but not interviewed …..……..

B4. Total number of people using your shared toilet ……. (**put 88 if he or she has no answer**)

Ennamba ya bantu abakozesa kabuyonjo eno. ……

B5. How many minutes does it take from your household to reach the toilet?

Waliwo eddakiika meka okuva mu nnyumba okutuuka awali kabuyonjo?

[1] ☐ 1 minutes or less [2] ☐ > 1 to 5 minutes [3] ☐ > 5 to 10 minutes

[4] ☐ > 10 to 20 minutes [5] ☐ > 20 minutes

B6. When can you say that your shared toilet is clean?

Mungeri ki joyinza okulaga nti kabuyonjo jokozesa namayumba amalala nyonjo?

1. ……

2. ……

B7. What do you use to clean your shared toilet?

Okozesa ki okuyonjya kabuyonjo gemugabana?

1. ……

2. ……

Social dilemma questions

<u>Attribution</u>

SD1. How dirty is the toilet you share with other households?

Kabuyonjo gyemukozesa na maka amalala nkyaafu kwenkana ki?

[1] ☐ Not dirty at all [2] ☐ A little bit dirty [3] ☐ Quite dirty [4] ☐ Dirty

[5] ☐ Very dirty

SD2 a. If dirty; Why is this shared toilet dirty or not as clean as it could be?

Bweba nga nkyafu lwaki sinyonjo nga bweyandibadde?

1. ……

SD2 b. If clean (not dirty at all); Why is this shared toilet clean or not as dirty as it could be?

Bweba nga nyonjo lwaki sinkyafu nga bweyandibadde?

1. ……

SD3. How frequent does any other member of your household clean the shared toilet?

Emirundi emeka amaka go gye gayonja kabuyonjo gye mugabana?

[1] ☐ Daily [2] ☐ Every week [3] ☐ Every after 2 weeks [4] ☐ Once every month [5] ☐ (Almost) never

<u>Social motives</u>

SD4. How frequent do you clean your shared toilet?

Emirundi emeka gyoyonja kabuyonjo gye mugabana?

[1] ☐ (Almost) never [2] ☐ every after use [3] ☐ Whenever I find it dirty

[4] ☐ Every week [5] ☐ Daily [6] ☐ Others (specify) ……

SD5. How important is it for you that leave your shared toilet clean after use?

Kyamugaso kwenkana ki gyoli kabuyonjo gye mugabana okujileka nga nnyonjo nga omaze okugikozesa?

[1] ☐ Not important [2] ☐ A little bit important [3] ☐ Quite important

[4] ☐ Important [5] ☐ Very important

SD6. How important is it for you to participate in cleaning your shared toilet?

Kyamugaso kwenkana ki gyoli gwe okwenyigila mukuyonja kabuyonjo gye mugabana?

[1] ☐ Not important [2] ☐ A little bit important [3] ☐ Quite important

[4] ☐ Important [5] ☐ Very important

SD7. Of the children and the adults, who mainly takes part in cleaning your shared toilet?

Ku bana na nabantu aba'kulu, ani mu maka gano atwaala obuvunaanyizibwa okuyonja kabuyonjo gye mugabana?

[1] ☐ None [2] ☐ Children [3] ☐ Adults [4] ☐ All household members

[5] ☐ Other (specify) …….

Social identity

SD8. Who are the other households you share with a toilet? (multiple)

Maka ki amalala gemugabana nago kabuyonjo?

[1] ☐ Close relatives [2] ☐ Neighbours next door [3] ☐ Neighbours but not on this house block [4] ☐ Known people/friends [5] ☐ Other (specify) ……

SD9. How much do you think that your participation in cleaning the shared toilet depends on your cooperation with other user households?

Olowooza kyenkana ki owenyiigira kwo mukuyonja kabuyonjo egabanibwa kisinzira ku nkolagana joyina na maka amalala agagikozesa?

[1] ☐ Not at all much [2] ☐ A little [3] ☐ Quite much [4] ☐ Much

[5] ☐ Very much

Behaviour of households users of shared toilets

SD10. How many other households do you share with a toilet room?

Number …….

Amaka ameka amalala bwemukozesa kabuyonjo? Omuwendo ----------

SD11. Of the above, how many households participate in cleaning?

Number ……

Kwabo waggulu, bameka abenyiigira mu kuyonja?

[1] ☐ (Almost) nobody (0%) [2] ☐ Some of them (25%) [3] ☐Half of them (50%) [4] ☐ Most of them [5] ☐ (Almost) all of them (100%) [6] ☐ I don't know/ no response

SD12. Do you clean the shared toilet more or less often than the other users?

Oyonja kabuyonjo gyemugabana emirundi mingi oba mitono ko okusinga kubalala abagikozesa?

[1] ☐ Much less [2] ☐ Less [3] ☐ Quite less [4] ☐ A little less

[5] ☐ Same as others [6] ☐ A little more [7] ☐ Quite more [8] ☐ More

[9] ☐ Much more [10] ☐ person doesn't clean

SD13. I do not clean the shared toilet more after use because other users do not do the same (how much do you agree with this statement).

Sirongosa kabuyonjo eyawamu nyo ngamaze ogikozesa kubanga abagikozesa abalala tebakola kyekimu?

[1] ☐ I strongly disagree [2] ☐ I disagree [3] ☐ I quite disagree [4] ☐ I rather disagree

[5] ☐ I neither agree nor disagree [6] ☐ I rather agree

[7] ☐ I quite agree [8] ☐ I agree [9] ☐ I very strongly agree

SD14. I do not participate in cleaning the shared toilet more because other users do not do the same (how much do you agree with this statement).

Nze senyiigira ennyo mukuyonja kabuyonjo eyawamu kubanga abagikozesa abalala tebakola kyekimu?

[1] ☐ I strongly disagree [2] ☐ I disagree [3] ☐ I quite disagree [4] ☐ I rather disagree

[5] ☐ I neither agree nor disagree [6] ☐ I rather agree

[7] ☐ I quite agree [8] ☐ I agree [9] ☐ I very strongly agree

Communication

SD15a. How often do you talk with other toilet sharing households on the way it is used or managed?

Mirundi emeka gyoyogera na maka bemukozesa nabo kabuyonjo ku ngeri gyekozesebwamu oba gyekuumibwa nga nyonjo?

[1] ☐ (Almost) never [2] ☐ Once in a while [3] ☐ Sometimes [4] ☐ Often

[5] ☐ (Almost) always

SD15b. If you talk, what do you talk with other households regarding the shared toilet?

Bwemuba nga mwogeraganya, biki byemwogera ebikwatagana ne kabuyonjo egabanibwa?

1. ……..
2. ……..

SD15c. In which form is always the talk?

Enjogera yamwe ebeera mungeri ki?

[1] ☐ Friendly manner [2] ☐ Quarrelling [3] ☐ Other (specify)……..

SD16. How difficult is it to talk to other households who you share with a toilet not to dirten it?

Kikalubiliza kitya okwogera naaba maka amalala abakozesa kabuyonjo obutagikyaafuwaza?

[1] ☐ Not difficult [2] ☐ Not so difficult [3] ☐ Quite difficult

[4] ☐ Difficult [5] ☐ Very difficult

SD17. How difficult is it to talk to other households to participate in cleaning your shared toilet?

Kikukalubiliza kitya okwogera naaba maka amalala okwenyiigira mukuyonja kabuyonjo egabanibwa?

[1] ☐ Not difficult [2] ☐ Not so difficult [3] ☐ Quite difficult

[4] ☐ Difficult [5] ☐ Very difficult

Noise

SD18. How often does it happen that you unintentionally leave the toilet dirty after use?

Mirundi emeka gyewesanga ngolese kabuyonjo nga nkyaafu nga tokigenderende ngomaze okugikozesa?

[1] ☐ (Almost) never [2] ☐ once in a while [3] ☐ Sometimes

[4] ☐ Often [5] ☐ (Almost) always

SD19. How much of the shared toilet dirt would you think is due to persons that just could not clean up or cannot be made responsible (e.g. children, elderly, sick)?

Olowooza bukyaafu bwenkana ki obukolebwa abantu abatasobola kuyonja oba abatavunanyizibwa (ekyokulabilako ng'abaana)?

[1] ☐ None (0%) [2] ☐ Some of it (25%) [3] ☐ Half of it (50%)

[4] ☐ Most of it (75%) [5] ☐ (Almost) all (100%)

SD20. Under what circumstances may you fail to clean the shared toilet?

Mbela ki eyinza okulemesa okuyonja kabuyonjo egabanibwa?

1. ……..……

2. ……..…

Perceived efficacy

SD21. How confident are you that households you share a toilet with cooperate in its cleaning?

Wekililizamu kyenkana ki nti amaka bwemugabana kabuyonjo bakkiriziganya nawe ku kyokugiyonja?

[1] ☐ Not confident [2] ☐ A little bit confident [3] ☐ Quite confident

[4] ☐ Confident [5] ☐ Very confident

SD22. How confident are you that your shared toilet can be kept clean if all households are cooperative?

Wekililizamu kwenkana ki nti kabauyonjo gyemugabana esobola okuumibwa nga nnyonjo singa amaka gonna gakkiriziganya?

[1] ☐ Not confident [2] ☐ A little bit confident [3] ☐ Quite confident

[4] ☐ Confident [5] ☐ Very confident

SD23. How confident are you that you will always leave your shared toilet clean every after use?

Wekililizamu kwenkana ki nti kabuyonjo gyemugabana ojagilekanga nga nyonjo nga omaze okugikozesa?

[1] ☐ Not confident [2] ☐ A little bit confident [3] ☐ Quite confident

[4] ☐ Confident [5] ☐ Very confident

SD24. How confident are you that you will always participate in cleaning your shared toilet?

Wekililizamu kwenkana ki nti oja kwenyiigiranga mu kuyonja kabuyonjo gyemugabana?

[1] ☐ Not confident [2] ☐ A little bit confident [3] ☐ Quite confident

[4] ☐ Confident [5] ☐ Very confident

Group dynamics

SD25. How good or bad is your relationship with the other households you share with a toilet, in terms of its cleaning?

Nkolagana ki ennungi oba embi gyemulina na maka amalala bwemugabana kabuyonjo mu ngeri yokugiyonja?

[1] ☐ Very bad [2] ☐ Bad [3] ☐ Quite Bad [4] ☐ Rather bad [5] ☐ Neither good nor bad [6] ☐ Rather good [7] ☐ Quite good [8] ☐ Good [9] ☐ Very good

SD26. How much do you feel as a team with other households in regard to your participation in cleaning the shared toilet?

Owulira kyenkana ki nga'bawamu n'amaka malala nga bwemugabana kabuyonjo nga mwenyiigira mukugilongosa?

[1] ☐ Not at all [2] ☐ A little bit [3] ☐ Quite much [4] ☐ Much [5] ☐ Very much

Gender

SD27. Of the males and females in your household, who is mainly responsible for the cleaning of the shared toilet?

Ku baami na bakyala munyumba yamwe, bani abasinga obuvunanyizibwa mukuyonja kabuyonjo gyemugabana?

[1] ☐ Males [2] ☐ Females [3] ☐ Both males and females

Cleaning habit

P1. How much do you feel as a matter of habit leaving your shared toilet clean after use?

Owulila mbu okuleka kabuyonjo gyemugabana nga nyonjo, nkola yo eya bulijo nga omaze okugikozesa?

[1] ☐ Not at all a habit [2] ☐ A weak habit [3] ☐ A medium strong habit

[4] ☐ A strong habit [5] ☐ A very strong habit

P2. How much do you feel as a matter of habit to participate in cleaning your shared toilet?

Owulila ekwenyigila mukulonsa kabuyonjo egagabanibwa nkola yo eyabulijo?

[1] ☐ Not at all a habit [2] ☐ A weak habit [3] ☐ A medium strong habit

[4] ☐ A strong habit [5] ☐ A very strong habit

P3. How frequent do you participate in cleaning your shared toilet?

Mirundi emeka gyewenyigila mukulongonsa kabuyonjo gyemugabana?

[1] ☐ Never [2] ☐ Once /several times a month [3] ☐ Every second week

[4] ☐ Once / several times a week [5] ☐ Every day or more often

P4.Other than, you how frequent does a member(s) of your household participate in cleaning the shared toilet?

Emirundi emeka omuntu,oba abantu bo munju yo jebenyiigira mukulongosa kabuyonjo gyemugabana?

[1] ☐ I don't know [2] ☐ Never [3] ☐ Once /several times a month

[4] ☐ Every second week [5] ☐ Once or several times a week [6] ☐ Every day or more often

P5. How automatic is it for you to clean your shared toilet after use?

Kyekola kitya kyoka gwe okuyonja kabuyonjo egabanibwa nga omaze ogikozesa?

[1] ☐ Not at all automatic [2] ☐ Not so automatic [3] ☐ Quite automatic

[4] ☐ Automatic [5] ☐ Very automatic

P6. How automatic is your participation in cleaning the shared toilet?

Kyekola kitya kyoka gwe okwenyigila mukulongosa kabuyonjo egabanibwa?

[1] ☐ Not at all automatic [2] ☐ Not so automatic [3] ☐ Quite automatic

[4] ☐ Automatic [5] ☐ Very automatic

P7. How much do you feel obligated to leave your shared toilet clean after use?

Buvunanyizibwa ki bwo wulila okuleka kabuyonjo egabanibwa nga nyonjo nga omaze ogikozesa?

[1] ☐ Not at all obligated [2] ☐ Not so obligated [3] ☐ Quite obligated

[4] ☐ Obligated [5] ☐ Very strongly obligated

P8. How much do you feel obligated to participate in cleaning your shared toilet?

Buvunanyizibwa ki bwo wulila okwenyiigira mu kulongosa kabuyonjo egabanibwa?

[1] ☐ Not at all obligated [2] ☐ Not so obligated [3] ☐ Quite obligated

[4] ☐ Obligated [5] ☐ Very strongly obligated

P9. How important is it for you to leave the shared toilet clean after use?

Kyamugaso kwenkana ki gyoli okulekanga kabuyonjo gyemugabana nga nyonjo nga omaze ogikozesa?

[1] ☐ Not important at all [2] ☐ Not so important [3] ☐ Quite important

[4] ☐ Important [5] ☐ Very important

P10. How important is it for you to participate in cleaning your shared toilet?

Kyamugaso kwenkana ki gyoli okwenyiigiranga mu kuyonja kabuyonjo gyemugabana?

[1] ☐ Not important at all [2] ☐ Not so important [3] ☐ Quite important

[4] ☐ Important [5] ☐ Very important

Intention

P11. How strongly do you intend to clean your shared toilet after use?

Kikukakatako kyekanaki okulongosa kabuyonjo gyogabana nga omaze ogikozesa?

[1] ☐ Not at all strong [2] ☐ A little [3] ☐ Quite strongly [4] ☐ Strongly

[5] ☐ Very strongly

P12. How strongly do you intend to participate in cleaning your shared toilet?

Kikukakatako kyenkanaki okwenyiigira mu kuyonja kabuyonjo gyemugabana?

[1] ☐ Not at all strong [2] ☐ A little [3] ☐ Quite strongly [4] ☐ Strongly

[5] ☐ Very strongly

P13. How likely is it that from now on, you will always leave your shared toilet clean after use?

Kikakasibwa kitya nti okuva kati onolekanga kabuyonjo gyemugabana nga nyonjo nga omaze ogikozesa?

[1] ☐ Very unlikely [2] ☐ Unlikely [3] ☐ Quite likely [4] ☐ Likely [5] ☐ Very likely

P14. How likely is it that from now on, you will always participate in cleaning your shared toilet?

Kikakasibwa kitya nti okuva kati onenyiigiranga mu kulongosa kabuyonjo gyemugabana?

[1] ☐ Very unlikely [2] ☐ Unlikely [3] ☐ Quite likely [4] ☐ Likely

[5] ☐ Very likely

Risk beliefs

P15. What diseases do you remember you or any of your household members suffering from in the last 5 months (Children inclusive)? (Multiple responses)

Ndwadde ki zojjukkira ezakwata ggwe oba omuntu yena munyumba yo mu bbanga lya myezi 5 egiyise (n'abaana nga obatwaaliddemu)?

[1] ☐ None [2] ☐ Diarrhoea [3] ☐ Malaria [4] ☐ T.B [5] ☐ Typhoid

[6] ☐ Others (Specify) ….

1. …….
2. …….

P16. How certain are you that you could get sick if you used a dirty toilet?

Olowooza miikisa gyenkana ki okubanga olwala bwokozesa kabuyonjo enkyaafu?

[1] ☐ Impossible [2] ☐ A little [3] ☐ Quite certain [4] ☐ Certain

[5] ☐ Very certain

P17. How certain are you that a member of your family could get sick if he or she used a dirty toilet?

Olowooza mikisa gyenkana ki nti omutu omu mu maka go ayinza okulwaala singa akozesa kabuyonjo enkyaafu?

[1] ☐ Impossible [2] ☐ A little [3] ☐ Quite certain [4] ☐ Certain [5] ☐ Very certain

P18. Imagine you contracted a disease like cholera, how severe would be the impact on your

Olowooza ngo ofunye endwadde nga ekiddukano oba kkolera, onokosebwa kyenkana ki nga ggwe mu

P18a…. social life?

Mubulamu obwa bulijjo?

[1] ☐ Not severe at all [2] ☐ Not so severe [3] ☐ Quite severe [4] ☐ Severe

[5] ☐ Very severe

P18b…. household?

Ng'amaka?

[1] ☐ Not severe at all [2] ☐ Not so severe [3] ☐ Quite severe [4] ☐ Severe

[5] ☐ Very severe

P18c…. economic situation?

Mu mbeera yenyingiza oba enfuna?

[1] ☐ Not severe at all [2] ☐ Not so severe [3] ☐ Quite severe [4] ☐ Severe

[5] ☐ Very severe

Attitudinal beliefs

P19. How negative do you think it is to use a dirty toilet?

Olowooza waliwo bukyaamu bwenkana ki mukozesa kabuyonjo enkyaafu?

[1] ☐ Not at all negative [2] ☐ A little bit negative [3] ☐ Quite negative

[4] ☐ Negative [5] ☐ Very negative

P20. How do (would) you feel to clean a toilet shared with other households?

Owulira otya okuyonja kabuyonjo egabanibwa na maka amalala?

[1] ☐ I dislike it very much [2] ☐ I dislike it [3] ☐ I quite dislike it [4] ☐ I rather dislike it [5] ☐ I neither dislike it nor do I like it [6] ☐ I rather like it [7] ☐ I quite like it [8] ☐ I like it [9] ☐ I like it very much

P21. How time consuming is it for you to clean your shared toilet after use?

Olowooza okuyonja kabuyonjo gyemugabana nga omaze ogikozesa, kukumalila obudde?

[1] ☐ Not time-consuming at all [2] ☐ A little bit time-consuming

[3] ☐ Quite time consuming [4] ☐ Time-consuming [5] ☐ Very time-consuming

[6] ☐ Do not clean

P22. How time consuming is it for you to participate in cleaning your shared toilet?

Olowooza okwenyiigira mu kuyonja kabuyonjo gyemugabana kukumalila obudde?

[1] ☐ Not time-consuming all [2] ☐ A little bit time-consuming

[3] ☐ Quite time consuming [4] ☐ Time-consuming [5] ☐ Very time-consuming

[6] ☐ Do not clean

P23. How effortful is it for you to leave shared toilet clean after use?

Olowooza kyetagisa amaanyi agenkana ki okuleka kabuyonjo gyemugabana nga nyonjo nga omaze ogikozesa?

[1] ☐ Not at all effortful [2] ☐ A little bit effortful [3] ☐ Quite effortful

[4] ☐ Effortful [5] ☐ Very effortful [6] ☐ Do not clean

P24. How effortful is it for you to participate in cleaning your shared toilet?

Olowooza kyetagisa amaanyi agenkana ki okwenyiigira mu kuyonja kabuyonjo gyemugabana?

[1] ☐ Not at all effortful [2] ☐ A little bit effortful [3] ☐ Quite effortful

[4] ☐ Effortful [5] ☐ Very effortful [6] ☐ Do not clean

P25. How satisfied are you with the current cleanliness of your shared toilet?

Olimumativu kyenkana ki n'obuyonjo bwa kabuyonjo gyemugabana?

[1] ☐ Not satisfied at all [2] ☐ A little satisfied [3] ☐ Quite satisfied

[4] ☐ Satisfied [5] ☐ Very satisfied

Normative beliefs

P26. In general, do you think most people important to you approve or disapprove that you clean the shared toilet after use?

Okutwaliza awamu, olowooza abantu abomugaso enyo gyoli bakkiriziganya oba tebakkiriziganya naawe ku kyokuyonja kabuyonjo gyemugabana nga omaze ogikozesa?

[1] ☐ Very strongly disapprove [2] ☐ Strongly disapprove [3] ☐ Quite strongly disapprove [4] ☐ Rather disapprove [5] ☐ Neither disapprove nor approve [6] ☐ Rather strong approval [7] ☐ Quite strong approval [8] ☐ Strong approval [9] ☐ Very strong approval

P27. In general, do you think most people important to you approve or disapprove that you participate in cleaning your shared toilet?

Okutwaliza awamu, olowooza abantu abomugaso enyo gyoli bakkiriziganya oba tebakkiriziganya naawe ku kyokwenyiigira mu kulongosa kabuyonjo gyemugabana?

[1] ☐ Very strongly disapprove [2] ☐ Strongly disapprove [3] ☐ Quite strongly disapprove [4] ☐ Rather disapprove [5] ☐ Neither disapprove nor approve [6] ☐ Rather strong approval [7] ☐ Quite strong approval [8] ☐ Strong approval [9] ☐ Very strong approval

P28. Do you feel a form of social pressure to leave your shared toilet clean after use?

Owulira kikusa kubunkenke okuleka kabuyonjo egabanibwa nga nyonjo onga omaze ogikozesa?

[1] ☐ Not at all [2] ☐ A little [3] ☐ Quite much [4] ☐ Much [5] ☐ Very much

P29. Do you feel a form of social pressure to participate in cleaning your shared toilet?

Owulira kikusa kubunkenke okwenyiigira mu kulongosa kabuyonjo egabanibwa?

[1] ☐ Not at all [2] ☐ A little [3] ☐ Quite much [4] ☐ Much [5] ☐ Very much

P30. If yes, who is mainly responsible for your feelings of social pressure to clean your shared toilet?

Ani asinga okusa ku bunkenke ku kyokuyonja kabuyonjo egabanyibwa?

[1] ☐ Own family members [2] ☐ individuals from other sharing households [3] ☐ Friends [4] ☐ Local leaders / Health workers

[5] ☐ Landlord [6] ☐ Others (specify) …….

Ability beliefs

P31. What is the main problem with the current shared toilet?

Buzibu ki bwolina ne kabuyonjo gyemukozesa kati?

[1] ☐ No problem [2] ☐ Dirty [3] ☐ Too many people use it [4] ☐ Difficult to empty

[5] ☐ Users not cooperative in its cleaning [6] ☐ Others (specify)…….

P32. How difficult is it for you to leave a shared toilet clean after use?

Kikalubiliza kwenkana ki okuleka kabuyonjo gyemugabana nga nyonjo onga omaze ogikozesa?

[1] ☐ Not difficult [2] ☐ Not so difficult [3] ☐ Quite difficult

[4] ☐ Difficult [5] ☐ Very difficult

P33. How difficult is it for you to participate in cleaning your shared toilet?

Kikalubiliza kwenkana ki okwenyiigira mu kulongosa kabuyonjo gyemugabana?

[1] ☐ Not difficult [2] ☐ Not so difficult [3] ☐ Quite difficult

[4] ☐ Difficult [5] ☐ Very difficult

P34. Why is it (refering to above response)

Lwaki kiri bwekityo (ngosinziila ku kiddidwamu waggulu)?

1. ……
2. ……

P35. Do you and other households have any detailed schedule or roaster regarding when to clean the shared toilet?

Gwe na ba amaka amalala mulinalina entegeka ennungamu ku kyokuyonja kabuyonjo gyemugabana?

[1] ☐ Not at all [2] ☐ A little bit [3] ☐ Quite a detailed schedule

[4] ☐ Detailed schedule [5] ☐ Very much detailed Schedule

Self-regulation

P36. How difficult is it to remember to clean your shared toilet after use?

Kikubeleera kitya kigumu okujjukira okuyonja kabuyonjo gyemugabana nga omaze ogikozesa?

[1] ☐ Not difficult at all [2] ☐ Not so difficult [3] ☐ Quite difficult

[4] ☐ Difficult [5] ☐ (Almost) impossible [6] ☐ Do not clean

P37. How difficult is it to remember to participate in cleaning your shared toilet?

Kikubeleera kitya kigumu okujjukira okwenyiigira mu kulongosa kabuyonjo gyemugabana?

[1] ☐ Not difficult at all [2] ☐ Not so difficult [3] ☐ Quite difficult

[4] ☐ Difficult [5] ☐ (Almost) impossible [6] ☐ Do not clean

P38. Do you feel committed to cleaning your shared toilet after use?

Owulira nga ki kukakatako okuyonja kabuyonjo gyemugabana nga omaze ogikozesa?

[1] ☐ Not at all committed [2] ☐ A little committed [3] ☐ Quite committed

[4] ☐ Committed [5] ☐ Very committed

P39. Do you feel committed to participate in cleaning your shared toilet?

Owulira nga ki kukakatako okwenyiigira mu kulongosa kabuyonjo gyemugabana?

[1] ☐ Not at all committed [2] ☐ A little committed [3] ☐ Quite committed

[4] ☐ Committed [5] ☐ Very committed [6] ☐ Do not clean

P40. Is ensuring participating in cleaning of your shared toilet part of your daily routine?

Olaba nti okwenyiigira mu kulongosa kabuyonjo gyemugabana nga nnyonjo kitundu kya milimu gyo egya bulijjo?

[1] ☐ Not at all [2] ☐ A little bit [3] ☐ Quite part [4] ☐ Part of daily activities [5] ☐ Very much part of daily activities

P41. If not, why?

1. ……

Number of people present during the interview ----------

Time interview ended ……..

For official use

Checked: ☐ Yes Initials: …… **Data entered:** ☐ Initials: ……

Date ….. / ……/…….. Date ….. / ……/……..

Cleaning of shared toilets in Kampala's slum communities

Interviewer's Pre-cleaning Intervention Checklist, August / September 2013

General information regarding the interview

A1. Participant's ID ---------- A2. Date -----/-----/ ------ (dd/mm/yyyy)

A3. Name of interviewer ----------

A4. Name of the respondent ……

A5. Contact of the respondent ……. and next in charge (name & contact) ……

A6. Division ----------

A7. Parish ----------

A8. Zone ----------

Observations

K0. Key special remark about the interview

1. ……

K1. Type of toilet household uses?

[1] ☐ flush toilet [2] ☐ pour flush [3] ☐ Ventilated Improved Pit latrine (VIP) [4] ☐ Ecosan [5] ☐ Simple pit latrine

K2. How many stances / rooms does the toilet block have? ……..

K3. What materials were used to build the toilet's superstructure?

[1] ☐ Cement and bricks [2] ☐ Wood, mud and wattle [3] ☐ Plastics [4] ☐ Iron sheets [5] ☐ Others (Specify ……)

K4. What is the slab of the toilet room built of?

[1] ☐ Cement and concrete [2] ☐ Wood, mud and wattle [3] ☐ Plastic [4] ☐ Others (Specify ……)

K5. Does the toilet facility have a vent pipe?

[1] ☐ Yes [2] ☐ No

K6. Is the toilet room dirty?

[1] ☐ Not dirty at all [2] ☐ A little bit dirty [3] ☐ Quite dirty [4] ☐ Dirty [5] ☐ Very dirty

K7. State of the toilet room?

K7a	excreta around the scot hole or floor	[1] ☐ Yes	[2] ☐ No
K7b	Floor wet with urine	[1] ☐ Yes	[2] ☐ No
K7c	Flies in the toilet	[1] ☐ Yes	[2] ☐ No
K7d	Toilet lid of the scot hole	[1] ☐ Yes	[2] ☐ No
K7e	Toilet smelly	[1] ☐ Yes	[2] ☐ No
K7f	Signs of excreta on the walls	[1] ☐ Yes	[2] ☐ No

K8. Is there garbage around or closer to the toilet block?

[1] ☐ Yes [2] ☐ No

K9. Is there stagnant water around the toilet or closer to the toilet block?

[1] ☐ Yes [2] ☐ No

K10. During which period was the survey conducted?

[1] ☐ Wet season [2] ☐ Dry season

K11. Is there any excreta around the toilet surrounding or closer to the respondent's household?

[1] ☐ Yes [2] ☐ No

K12. Is the toilet accessible enough to be emptied by a vacuum truck?

[1] ☐ Yes [2] ☐ No

K13. Number of households on the house block? …….

K14. Number of housing blocks that use the toilet? ……...

Appendix B: Public commitment form

COMMITMENT TO KEEP OUR SHARED TOILET CLEAN

I ……., as a member of this group with whom I share a toilet, commit myself to cooperate in its cleaning - together with my other household members. This is because using a clean toilet keeps us healthy and active.

OKWEYAMA OKUUMA KABUYONJO GYETUGABANA NGA NYONJO

Nze…….. ngo'mu kwabo betugabanya nabo kabuyonjo yaffe, neyama okukolaganira wamu nabo munju ya'nge na'maka amalala okuyonjanga kabuyonjo yaffe. Kino kikolebwa kuba okukozesa kabuyonjo nga nyonjo kitukuuma nga tulibalamu nobulamu obweyagaza.

Signature

……..

Date of commitment

…….

Number	Group participant names / Witnesses	Phone number	Signatures

Appendix C: Curriculum Vitae

CURRICULUM VITAE (CV) FOR INNOCENT KAMARA TUMWEBAZE

Personal data

Name : Innocent .K. Tumwebaze

Nationality : Ugandan

Date of Birth : 2nd September 1980

Profession : Social Scientist / Epidemiologist

Address : P.O Box 21302, Kampala - Uganda

Tel: +256 774 266559

E-mail kamara.innocent@gmail.com

Research interests

The overarching goal of my career is to increase scientific and factual knowledge for the application of theory and evidence-based research in behaviour change promotions, for sustained investments in Water, Sanitation and Hygiene (WASH) as well as appropriate use and maintenance of WASH facilities in developing countries. My research areas include behaviour change, health and social psychology, public health interventions in developing countries as well as sanitation and hygiene in urban slums.

Education

2010-2014 **PhD candidate** at the Swiss Federal Institute of Aquatic Science and Technology (Eawag) and the University of Zurich, Switzerland; Completed 30th September 2014

Degree: PhD in Psychology

Thesis title: Increasing cleaning behaviour of shared toilet users in Kampala's slums, Uganda

2007-2009 **MSc. in Clinical Epidemiology and Biostatics,** Makerere University, Uganda

Thesis: Ecological sanitation coverage and associated factors in Kabale Municipality, Uganda

2002-2005 **BA. in Social Sciences (Sociology and Psychology)**, Makerere University, Uganda

Professional training & Short courses

2014 Training Certificate in 'doing the right things right' – research integrity in a complex society. Doctoral summer school training organised by the League of European Research Universities' (LERU), held 14 – 18th July 2014 at University of Helsinki, Finland

2013 Training Certificate in planning and design of sanitation systems and technologies held 10 - 12 April 2013 at Swiss Federal Institute of Aquatic Science and Technology (Eawag), Switzerland

2012 Training Certificate in institutions, livelihoods and conflict management held between 23 - 29 August 2012 (NCCR North-South) in Meiringen, Switzerland

2010 EAWAG Partnership Programme fellowship as a student trainee in the Department of System Analysis, Integrated Assessment and Modelling (SIAM), Switzerland, June to August 2010

2010 Training Certificate in NCCR North-South integrated training and capitalisation of experience (ITC) in Bahir Dar, Ethiopia 1 - 12 September 2010

2010 Training Certificate in Quantitative methods in ecology and epidemiology, Makerere University, Uganda, from 12 - 16 April 2010

2009 Certification of completion of safe and sustainable sanitation intensive training course, including pre-conference workshop on safe and sustainable sanitation and dry toilet 2009 conference held at Tampere University of Technology, Finland on 10 - 15 August 2009

2009 Certificate of Attendance on documentation, media, monitoring and evaluation and basic skills training organised by WaterAid Uganda from 12 - 16 January 2009

2008 Certificate of Attendance of an introduction to community health clubs approach course by Applied Health and Education Development (AHEAD) held in Gulu district, Uganda from 27th to 29th 2008

Work experience

2010-14 Eawag, Switzerland and Uganda

Project: Demand-led solutions for improved sanitation and hygiene behaviour change in Kampala's urban informal settlements, Uganda.

Principal investigator for the PhD research and project coordinator.

2010-12 Makerere University School of Public Health (MUSPH), Uganda

Department of community health and behavioural sciences

Tutor, communication for behaviour change module and involved in developing teaching materials for gender and health module.

2011 Alpha Beta Consult, Uganda

Project: Developing an environmental management strategy for Kampala Capital City Authority (KCCA).

Consultant in charge of waste management and environmental sanitation.

2007-09 Sustainable sanitation and water renewal systems (SSWARS) NGO, Uganda

Project: Social marketing for water and sanitation improvement and waste recycling systems in Kawempe division, Kampala.

Community mobilization and Monitoring and Evaluation officer

2006-07 WaterAid Uganda

Project: Water and sanitation services.

Research assistant, providing support in research and documentation.

2005 Makerere University Institute of Social Research (MUISR), Uganda

Project: Gender, culture and construction of ideal womanhood under the military regime of Idi Amin.

Research assistant, involved in data collection, transcribing and analysis.

2004 Makerere University Institute of Environment and Natural Resources, Uganda

Project: Impact of community mobilization in the provision, operation and maintenance of water and sanitation facilities in Wakiso, Uganda.

Research assistant, involved in data collection and tools development.

Teaching

Assistance of Prof. Dr. Mosler in some seminars at the University of Zurich on the application of theory models in behaviour change research.

Journal articles peer reviews

I review articles for Journal of Public Health, International Journal of Environmental Research and Public Health and Journal of Environment, Development and Sustainability.

Personal profile

Result oriented and hard working. Easily adapt to diverse working environments.

Languages

English (Excellent), Runyakitara (native), Swahili (good), German (Beginner)

Interests

Travelling, learning other peoples cultures and ways of life, sports, dancing

Referees

1. Prof. Dr. Hans-Joachim Mosler

   Associate Professor for social and environmental psychology at the University of Zurich, and Senior researcher and leader of Environmental and Health Psychology group at the Swiss Federal Institute of Aquatic Science and Technology (Eawag)

   P.O Box 611, 8600 Dubendorf, Switzerland

   Email: Mosler@eawag.ch

2. Dr. Christoph Lüthi (PhD)

   Senior Scientist,

   Swiss Federal Institute of Aquatic Science and Technology (Eawag), Department of Water and Sanitation in Developing Countries

   P.O Box 611, 8600 Dubendorf, Switzerland

   Email: Christoph.luthi@eawag.ch

3. Dr. Charles Niwagaba

   Founder & CEO, Sustainable Sanitation & Water Renewal Systems (SSWARS) NGO

   Senior Lecturer of Civil and Environmental Engineering

   Department of Civil & Environmental Engineering

College of Engineering, Design, Art and Technology (CEDAT)

Makerere University

P. O. Box 7062

Email: cniwagaba@cedat.mak.ac.ug

Publications

a) Peer-reviewed publications

1. **Tumwebaze K. I.**, Mosler H-J (2014). Why clean the toilet if others don't? Using a social dilemma approach to understand users of shared toilet's collective cleaning behaviour in urban slums: a review. Journal of Water, Sanitation and Hygiene for Development 3, 359-370
2. **Tumwebaze K. I.,** Niwagaba B. C., Günther I., Mosler H-J. (2014). Determinants of households' cleaning intention for shared toilets: Case of 50 slums in Kampala, Uganda. Habitat International 41, 108-113.
3. Mazeau A., **Tumwebaze K.I.**, Lüthi C., Sansom K. (2013). Inclusion of shared sanitation in urban sanitation coverage? Evidence from Ghana and Uganda. Waterlines 32, 334-348
4. **Tumwebaze K. Innocent** (2013). Prevalence and determinants of the cleanliness of shared toilets in Kampala slums, Uganda. Journal of Public Health 22, 33-39
5. **Tumwebaze K. I.,** Christoph L. (2013). Households' access and use of water and sanitation facilities in poor urban areas of Kampala, Uganda. Journal of Water, Sanitation and Hygiene for Development 3, 96-105
6. **Tumwebaze. K. I.,** Niwagaba B. N., Orach G. C., Luethi C., Mosler H-J. (2012). Sanitation facilities in Kampala slums, Uganda: users satisfaction and determinant factors. International Journal of Environmental Health Research 23, 191-204

7. **Tumwebaze K. I.**, Orach G. C., Kalyango J. N., Lüthi, C., Karamagi C., Niwagaba B. C. (2011). Ecological sanitation coverage and factors affecting its uptake in Kabale Municipality, Western Uganda. International journal of Environmental Health Research 21, 294-305

b) Non-peer reviewed publications

1. **Tumwebaze K. I.,** Horst A., Lüthi C. (2012). Interdisciplinary research on urban sanitation in Kampala's slum settlements – preliminary results. Sandec Magazine, Eawag
2. Günther I., Horst A., Lüthi C., Mosler H-J., Niwagaba B. C., **Tumwebaze K. I.** (2012). When is shared sanitation improved sanitation? The correlation between number of users and toilet hygiene. Research for Policy 2. ETH Zurich, Switzerland
3. Günther I., Horst A., Lüthi C., Mosler H-J., Niwagaba B. C., **Tumwebaze K. I.** (2011). Where do Kampala's poor "go"? Urban sanitation conditions in Kampala's low-income areas. Research for Policy 1. Eawag, Switzerland

c) Conference proceedings and scientific reports

1. **Tumwebaze K. I.,** Mosler H-J. (2014). Dirty toilets a health threat: Social-cognitive and dilemma factors influencing collective cleaning of shared toilets in Kampala's urban slums, Uganda. In proceedings of the 28th conference of the European Health Psychology Society held on 26th – 30th August 2014 in Innsbruck, Austria.
2. **Tumwebaze K. I.,** Mosler H-J. (2013). Habit determinants for users' cleaning of shared toilets in urban informal settlements: Case of Kironde village, Kampala, Uganda. In proceedings of the Water and Health Conference at University of Chapel Hill held on 14th – 18th October 2013 in North Carolina, USA.
3. **Tumwebaze. K. I.** (2013). Making sanitation research relevant to policy and practice: Case study of slums in Kampala, Uganda. In proceedings (Workshop – Linking science, practice

and policy under increasing complexity and uncertainty) of the World Water Week conference in Stockholm, Sweden, 01 – 06 September 2013

4. **Tumwebaze K. I.** (2013). Gender and sanitation perspectives in Kampala's slums, Uganda. In the proceedings of the 36th International WEDC Conference, Nakuru, Kenya, 01 – 05 July 2013.
5. **Tumwebaze K. I.,** Mosler H-J. (2012). Households' main water sources and risk of contamination in Kampala's slums, Uganda. In proceedings of the Water Safety Conference held on November 13 – 15, 2012 in Kampala, Uganda.
6. **Tumwebaze K. I.**, Mosler H-J. (2012). Households' access to safe water and improved sanitation in urban slum settlements: case of Kampala's slums, Uganda. In proceedings of the Water and Health Conference at University of Chapel Hill held on October 29 – 2nd November 2012 in North Carolina, USA.
7. **Tumwebaze K. I.,** Mosler H-J. (2012). Developing behaviour change techniques targeting cleaning of shared toilets in Kampala's slums. In proceedings of the Water and Health Conference at University of Chapel Hill held on October 29 – 2nd November 2012 in North Carolina, USA.
8. **Tumwebaze K. I.,** Mosler H-J. (2012). Developing behaviour change techniques targeting cleaning of shared toilets in Kampala's slums. In proceedings of the International Conference on Research for Development held on 20 – 22 August 2012 in Bern, Switzerland.
9. **Tumwebaze. K. I.,** Niwagaba B. N., Luethi C., Mosler H-J. (2012). Sanitation challenges in Kampala's slums and intervening factors. In proceedings of the International Conference on Research for Development held on 20 – 22 August 2012 in Bern, Switzerland.
10. **Tumwebaze. K. I.,** Niwagaba B. N., Orach G. C., Luethi C., Mosler H-J. (2011). Need for toilet technological shift in urban informal settlements; Case of Kampala – Uganda. In

proceedings of the International Water Association (IWA) Development Congress 21-24 November 2011, in Kuala Lumpur, Malaysia

11. **Tumwebaze. K. I.,** Niwagaba B. N., Mosler H-J. (2011). Bringing tenants into the equation for attainment of improved sanitation in urban slum communities: the case of Kampala slums, Uganda. In proceedings (Workshop 7 – Oral Presentations) of the World Water Week conference in Stockholm – Sweden, 21 – 27 August 2011
12. **Tumwebaze K. I.,** Niwagaba B. C. (2011). Ecological sanitation uptake, knowledge and beliefs in Kabale Municipality, Kabale District. In the proceedings of the 35th International WEDC Conference, Loughborough, UK, 06 – 08 July 2011
13. Twebaze J. B., Azza N., Kamara J. K., **Tumwebaze K. I.** (2011). Content of community mobilization messages and effect on rural water supply and sanitation programs. In proceedings of the 35th International WEDC Conference, Loughborough, UK , 06 – 08 July 2011
14. **Tumwebaze K. I.,** Niwagaba B. C. (2011). Effect of integrated social marketing on sanitation promotion in urban slum communities: the case of three parishes in Kawempe division- Kampala Uganda. In proceedings of the East Africa Regional Practitioners Workshop on Pro-poor Urban Sanitation and Hygiene in Kigali-Rwanda, 29 – 31 March 2011.
15. **Tumwebaze K. I. (2009)**. Ecological sanitation coverage and associated factors in Kabale Municipality. A dissertation submitted in partial fulfillment of the requirements for the award of the degree of masters of Science in Clinical Epidemiology and Biostatistics of Makerere University.
16. **Tumwebaze K. I.**, Sande H. T., Niwagaba C. B. (2009). Sanitation sustainability in communities with cultural diversities to improve health in Kampala slum environment. In proceedings of the Dry Toilet Conference 12-15 August 2009 in Tampere University of Technology in Finland.

17. **Tumwebaze K. I.**, Sande H. T., Niwagaba C. B. (2009). Breaking cultural rigidity in promotion of EcoSan and excreta re-use in urban slum areas. Linking ecological sanitation users to farmers in Kampala. In proceedings of the Dry Toilet Conference 12-15 August 2009 in Tampere University of Technology in Finland.
18. **Tumwebaze K. I.**, Ssempebwa J. C., Niwagaba C. B., Kamara J. F. (2009). The prevalence of ecological sanitation coverage and associated factors in Kabale Municipality. In proceedings of the Dry Toilet Conference 12-15 August 2009 in Tampere University of Technology in Finland.
19. **Tumwebaze K. I.**, Sande H. T., Niwagaba C. B. (2008).Social Marketing for Scaling-Up Sanitation for the urban poor ~ A case of slum communities in Kawempe Division, Kampala City. In proceedings of the IRC Symposium on Sanitation for the Urban poor; Partnerships and Governance, held in Delft, The Netherlands, 19-21 November 2008.
20. Niwagaba C. B., Ssemmanda J., Sande H. T., **Kamara T. I.** (2008). Social marketing for sanitation improvement in Kampala, Uganda. In proceedings (Part 1 – Oral Presentations) of the International Water Association (IWA) Conference of the Sanitation Challenge, New Sanitation Concepts and Models of Governance, held in Wageningen, The Netherlands, May 19-21, 2008.
21. **Tumwebaze K. I.** (2007). Implementing sanitation interventions to have toilets for all, based on one model village in Uganda. In proceedings of the 2007 World Toilet Summit in New Delhi, India, October 31st to 4th November, 2007